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Vocational Departments in High Schools vs. Separate Vocational Schools

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IN discussing the relative merits of the vocational department of the high school and the separate vocational school, the writer wishes to make clear that his beliefs are based on general experience. He does not lose sight of the fact that there are individual exceptions to the observations presented. These exceptions, however, are not considered below.

Attempts on the part of the conventional public schools to promote industrial education on any scale, such as would compare with the work contemplated by the Smith-Hughes Law, have in the past proved inadequate. Separate vocational schools have been forced to grow up to meet the new demands. This encroachment on the sacred prerogatives and traditions of the public school system has been quite generally resented by old time school people. The momentum of vocational educational movements has become so great and so irresistible that the conventional schools are now seeking to adopt this new, and previously unwelcome child. The conventional schools, therefore, thru the force of circumstances are reconciling themselves to this foster child, and expect to make happy the adoption by conducting vocational work as a department of the high school.

The relative merits of the separate vocational school as against the vocational department of the high school depend largely on the point of view and the understanding of what is meant by vocational education. In this discussion, while not intending to detract in any degree from the proper functioning or growth of the public school system, we accept in the premises the urgent desirability of a vocational educational system.

If, as sometimes roughly estimated, that approximately ten per cent of the population attend high school, while the other ninety per cent go directly into industrial pursuits, then there is no prima facia evidence to justify the position that this supplementary,—this vocational—education, reaching such a large percentage of our people, should be a mere department of an institution which administers to the needs of only ten per cent of the population. The educational traditions of the high school and the customary practice in general education inevitably creep into the administration, into the pedagogy and ideals of the vocational department. This can be attested by the fact that in so many high schools today the authorities still believe that the work of the manual training department of the high school, and vocational education are one and the same. This fact indicates that at least these manual training departments of our high schools are made over into vocational schools with very little change in conception, and no fundamental practical adaptation to new needs and a new set of circumstances.

Other difficulties are that vocational teachers need to be of a different type from those the high school usually provides, that is to say, they need to be not only pedagogs, but eminently practical men and women. The standard of requirements for teachers for regular high school departments, and the vocational department are so diverse as to suggest difficulty and embarrassment in administration.

Vocational education requires intimate contact with industry and a knowledge of community industrial needs and conditions. In other words, the work must have a different approach, must be undertaken in a new way, handicapped by no customs or traditions but influenced only by the needs of our industrial workers. Vocational education must be allied with organized industrial forces, otherwise it cannot be adequately responsive to industrial needs. The advisory boards of employers and employes which become necessary in vocational work are foreign to the high school system, and if called into council to advise on the work of a department of the high school would likely extend their influence in other quarters where it would not be so desirable. Consequently, friction is certain to follow, due to differences in point of view on the administrative policy of the institution by which the vocational department is controlled.

An advantage of the vocational department in the high school, it may be contended, is the saving of expense. In an industrially important community, however, this is not borne out by experience. The demands of vocational education, the proportion of the

population helped thereby, the relation of vocational education to our economic and social welfare are factors which when once understood, forever silence both the argument of economy, and that of departmentalization. Vocational education is yet in its infancy, and even today scarcely any high school is adequately equipped for such a growing, enterprising, and practical movement. If new buildings are necessary, and they are, why not at the outset adapt them for the specific job, and avoid the confusion of trying to mix oil and water!

Assume for a moment that equipment and administration offer no hindrance to the proper development of vocational work. Let this fact be remembered. The high school is an institution dealing with pupils who have not yet entered into industrial activity. On the other hand, the vocational school, or department, deals with those who have already participated in industrial work of one sort or another. On the one hand with the high school pupil the whole point of view is academic or theoretical, and any contact with the practical must of every necessity be approached from the theoretical point of view. On the other hand, in the vocational school pupils are engaged in industrial work and their point of view is practical, and the point of view of their teachers must be practical so that any approach to academic or theoretical instruction must of necessity come from the practical point of view. This, incidentally, makes the clear distinction between vocational education and manual training. And with the vocational department in the high school the manual training psychology tends to prevail because of the predominant academic character of the high school. To reiterate, the high school gives a theoretical approach to the practical, since its pupils are unacquainted with practical experience, while the vocational school, on the other hand, gives a practical approach to the theoretical, since its pupils are lacking in theoretical knowledge. These are points of view which project in opposite direction, and in the judgment of the writer are irreconcilable. They necessitate two different educational institutions which must out of the very nature of the circumstances function differently, and independently.

There are other positive advantages which go with the separate vocational school. In the first place, the separate vocational school affords the best administrative possibilities, in that the school can be best organized for part time work. Part time work constitutes the major portion of vocational work. The separate vocational school has more independence in procuring the assistance of practical men; it has the proper opportunity to work in conjunction with joint advisory boards from industry comprising both employers and employes; it can adapt the school to suit the psychology of vocational workers and give to them the school environment consistent with their industrial pursuits; it can with comparative ease eliminate traditional grading, and allow a classification of pupils, as dictated by the exigencies of necessity. Moreover, it affords opportunity for individual initiative in the teaching staff, causing new successes to grow out of new problems. This is certainly not nearly so possible where the vocational school enterprise is fostered under the wings, as it were, of the high school.

In the second place, there are certain social advantages in the separate vocational school. The writer has observed that there is difficulty in getting vocational pupils to go into the high school where vocational departments exist in the high school. Working boys and girls very often shrink from the atmosphere of the high school, and, moreover, there is a tendency on the part of regular high school pupils to draw a line of contrast between themselves and those who are in the vocational department. This was evidenced in one case where the high school annual was issued containing sections for the freshmen, the sophomores, the juniors, and the seniors, but tacitly omitting any mention of the vocational boys and girls. The vocational pupils remarked about it, and knew they were consciously ignored. The development of social class consciousness is accentuated unduly, in the judgment of the writer, thru the forced mixing of these two groups of pupils at the present time. At some subsequent date when respect for honest work is more universal, conditions may be different, but at the present time this forced association does not always bring happy results. Perhaps most important of all the social consideration is the fact that so long as the vocational school is a separate institution, there is a better chance of the right importance being attached to its work than could be possible so long as the vocational work is a mere department of the high school. Another distinct social advantage accrues from the fact that the boys and girls who attend the separate vocational school actually feel a sense of proprietorship in it. It is their school, and accordingly, it becomes the center of social and civic interest and at the same time affords splendid opportunity for unconscious public surveillance.

In the third place, the results aimed at by vocational education are certain to be better if the education is carried on in an institution designed exclusively for, and operated with the single view of supplementing adequately the education of the worker. Experience in Wisconsin shows that where the vocational school is separate the effectiveness of the work shows an accumulation of good results.

To summarize, the writer reiterates his belief that from the point of view of vocational or industrial education, generally speaking, the advantages lie with the separate vocational school. This belief is based upon the consideration of the inherent incapacity of the traditional high school to respond sufficiently to the needs of industry and industrial society. On the other hand, the administrative machinery of a separate vocational school can be adapted to the specific type of

training needed. The separate organization allows for free use of advisory boards resulting in the school coming closer to the atmosphere of industry. The points of view on education are entirely different in the two types of school, the high school giving a theoretical approach to the practical, the vocational school giving a practical approach to the theoretical. The opportunity to organize the school on a part-time basis is greatly facilitated by separation. Vocational education has such tremendous import out of all proportion to what would be indicated by making it a department of a school which comprises only a small minority in any community. There are other various social and economic reasons in favor of separate vocational schools which will be suggested by a study of this question. It would seem to be self evident that the value of vocational education is considerably enhanced by the institution which is developed, operated, and maintained for the exclusive job on hand, rather than when fostered in a department of an institution whose ideals usually educate young people against the work of the world, and which equips for efficient social and industrial service even at the best, only a small fraction of our total society.

WINTER LOGGING CAMP IN ITASCA COUNTY, MINNESOTA.

THE FOREST SERVICE AND YOU

W. L. Mathews, J. Sterling Morton High School, Cicero, Illinois

HAVE you ever wished for pictures of lumbering operations or forest-service activity, as an aid in teaching correlated material to classes in woodwork?

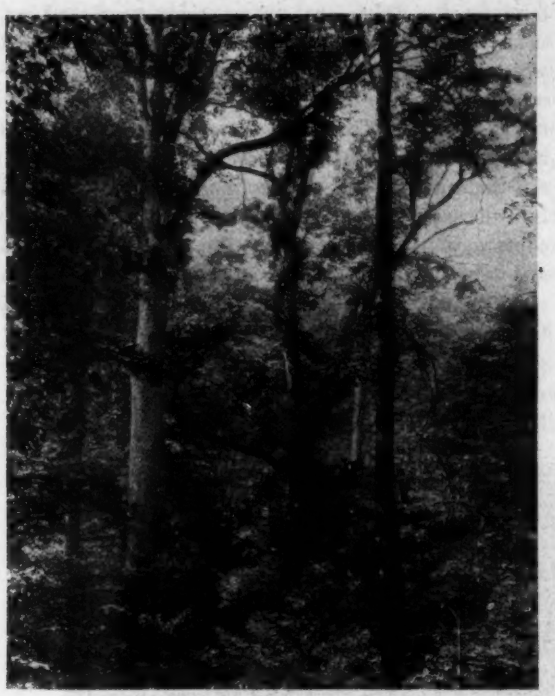
For this purpose, the United States Forest Service will loan sets of thirty samples of commercially important woods of the United States, together with maps showing the region in which each species grows, the natural forest regions of the United States, and the national forests. Short statements give the principal uses and physical characteristics of the woods, and charts and tables show forest products by States, the rise and fall of the lumber industry, and the percentage of lumber supplied by different regions. This exhibit is placed on mounts measuring 16x10 inches, which are arranged in seven panels of four sections each, with eyelets in the upper corners for hanging. The entire exhibit occupies a space about four feet high by thirteen feet long.

The Service has also prepared a collection of 44 enlarged photographs of the forests of the United States, showing how they are used and how they may be preserved. They are finished in black and white and arranged in eleven series of four pictures each. These series, with their descriptions, form illustrated "stories" of special features of forest work and forest conditions. Each series is mounted in panel form, with eyelets for hanging. One entire exhibit covers a wall space four and one-half feet high and about fourteen feet long.

A few sets of bromide enlargements, consisting of twelve panels of four pictures each, finished in sepia, have been made up and are sent out when available.

These exhibits are loaned for short periods on condition that the borrower agrees to pay transportation charges, to be responsible for the material while charged with it, and to forward it promptly at the direction of the Forest Service. *Applicants should state that they agree to these conditions.* Effort is made to arrange itineraries of exhibits so that borrowers will usually have to pay for transportation one way, and that wherever practicable transfers may be made between borrowers residing near each other. The last borrower on the list, however, is always asked to pay transportation charges to Washington. Each exhibit packed for shipment weighs about thirty pounds.

Application for the loan of exhibits should be made directly to The Forester, U. S. Department of Agriculture, Washington, D. C.



GOD'S FIRST TEMPLES.
White Oak and Chestnut Oak on West Slope, Westmoreland, Tenn.

In addition to the loan of these exhibits, the Forest Service is authorized to sell photographic prints, lantern slides, bromide enlargements, and transparencies.

The negatives in the collection of the Service number about 100,000 and are classified under the following subjects:

1. City Trees (Streets, parks, etc.; protection of city trees).
2. Cutting on National Forests (Illustrating methods of lumbering followed by the Forest Service).
3. Diseases and Injuries of Forest Trees (Except by fire).
4. Erosion and Floods (In relation to forests).
5. Forest Fires and Their Effects (With means of prevention).
6. Forest Engineering (Permanent improvement work on the National Forests, such as road and bridge building).
7. Forest Types (According to regions and species).
8. Forest Utilization (Industries based upon the forest, except lumbering).
9. Foresters at work (Work of technical foresters, forest students, and forest rangers, except permanent improvement work on National Forests).
10. Geological Formations (A few, only).
11. Grazing and Its Effects (Particularly on ranges within the National Forests; also in woodlots).
12. Homesteads, Cabins, Camps (Particularly Forest Service Stations and Homesteads within the National Forests).
13. Individual Species and Their Parts (Not all species of American trees, but most of the important ones).
14. Irrigation and Its Effects (A few, only).
15. Lumbering (Logging, milling, cut-over lands).
16. Mining and Mine Timbers (Mines within National Forests; Utilization of Wood for props, etc.).
17. Miscellaneous.
18. Planting and Plantations (Seed sowing, nurseries, transplanting, and plantations, both private and Government work).
19. Reproduction (See dispersal; sprouts. On lumbered or burned tracts; and in the forest).
20. Sand Areas (Dunes and deserts; reclamation by tree planting).
21. Silvicultural operations (Thinnings and systems of cutting).
22. Timber Tests (Laboratory tests of beams, wood specimens, etc.).
23. Topography (General views. Classification of National Forest lands).
24. Water Power (Developed and undeveloped power sites).
25. Wood Preservation (Operations, plants, treated and untreated timbers).

At my request, the Service prepared, sometime ago, a list of about two hundred titles on the subjects of Lumbering, Forest Types, Individual Species, and The Work of the Forest Service.

From this list, I have selected those which seemed to me to be of special merit for use in connection with manual-arts classes. This list is given below. Other titles may be secured by submitting a list of subjects to be illustrated to the Forester, U. S. Department of Agriculture, Washington, D. C. In doing this, give the number desired on each subject and state as fully as possible the character of the pictures wanted.

If prints are to be ordered, the size preferred should also be stated. A careful selection of the negatives will then be made by the Service and a list submitted to the purchaser with a statement of the cost of furnishing the material.

Payment for all material made for sale is required in advance. Remittances should be made by Postal money order or bank draft drawn in favor of "A. Zappone, Disbursing Clerk, U. S. Department of Agriculture," but mailed to the Forest Service. Requisitions

IN A DISMAL SWAMP.
Cypress Swamp in Terrebonne County, Louisiana.

should be placed as far in advance as possible, since material for sale can be made only as the regular work of the Photographer of the Forest Service will permit.

Price List of Photographic Work.

Photographic Prints:

Size	Unmounted	Mounted
4 x 5	$0.06 each	$0.08 each
4¼ x 6½	.07 each	.09 each
5 x 7	.08 each	.10 each
6½ x 8½	.11 each	.14 each
8 x 10	.17 each	.20 each

Lantern Slides, uncolored	each,	$0.35
Bromide Enlargements	per square inch,	.003
Bromide Enlargements (Sepia)	per square inch,	.004
Transparencies	per square inch,	.015
Coloring Lantern Slides	each,	.65
Coloring Bromide Enlargements	per square inch,	.01
Coloring Transparencies	per square inch,	.02

LITTLE TAMARACK LAKE, NORTH MANITOU ISLAND, LEELANAU COUNTY, MICH.
Showing Tamarack, Hemlock, Black Spruce, White Cedar and Hard Wood.

The selected list follows:

37369—A Minnesota logging camp in winter. Minn. National Forest, Cass Co., Minn. Print, 5x7.

43100—Sawing down a red pine. Minnesota National Forest, Minn. Size. 5x7.

11179—Sawing shortleaf pine into logs. Pine Bluff, Ark. Size, 5x7.

63854—Spruce logs on skidways and in pond. Rumford Falls, Oxford Co., Maine. Size, 4x5.

53845—Steam log loader at work, showing empty car under loader. Cass Co., Minn. Size, 5x7.

85719—Car loaded with No. 4 white pine boards, 25 and 36 feet. Menominee Indian Reservation, Neopit, Wis. Size, 5x7.

53842—A McGifford steam log loader propelling itself along log railway. Minnesota National Forest, Minn. Size, 5x7.

15108A—Loading poles cut from Norway pine; stumpage paid for this timber was $16.00 per thousand. Minnesota National Forest, Cass Co., Minn. Size, 5x7.

27070—Logs hauled by big wheels drawn by mules. Loblolly pine. Georgetown, S. Car. Size, 4x5.

37583—Logs hauled by big wheels and oxen. Near Tryon, N. Car. Size, 5x7.

12478—Oxen hauling large log. Sherman Mill, Strawberry Valley, Cleveland National Forest, Cal. Size, 5x7.

49276—Trailers. Loads of logs ready to be coupled together for a 14 mile haul with 6 and 8 horse team. Pine Island, Itasca Co., Minn. Size, 4x5.

43245—A big load of white pine logs at Ruse Bros. Camp. Northern Michigan. Size, 5x7.

37350—Hauling the first load of pine logs out over a newly opened log road. Minnesota National Forest, Minn. Size, 5x7.

43102—Loading a sprinkling tank with barrel and cross-haul for making ice roads. Minn. National Forest, Minn. Size, 5x7.

37357—A sprinkling tank at work putting water on the log road to be frozen into ice to make a solid bottom. Minnesota National Forest, Cass Co., Minn. Size, 5x7.

81323—"Ice" locomotive hauling sled loads of logs. Crow Wing Co., Minn. Size, 5x7.

1726A—Rangers scaling timber on Whiting and Berry timber sale. Apache National Forest, Ariz. Size, 4x5.

82300—Scaling logs on skidway. Missoula National Forest, Mont. Size, 4¼x6½.

2350A—Logging at the Reardon sale. Haulers driving in and swampers at work on logs. Western yellow pine. Zuni National Forest, Shotgun Dist., New Mexico. Size, 4x5.

12396A—The Hazel Mill Co.'s roading donkey logging to a pond near French Creek Station. Snoqualmie National Forest, Wash. Size, 4x5.

28454—Load on "go-devil." Very uneconomical method of hauling on ground, except in spring or muddy weather. 400′ B. M. average load. Makes 8 trips a day, practically same as trucks. Gallatin National Forest, Mont. Size, 5x7.

43260—Assorting logs. Logs in booms. Northern Michigan. Size, 5x8.

42258—Assorting logs for mills. Logs in booms. Northern Michigan. Size, 5x8.

43252—Men riding logs down stream. Northern Michigan. Size, 5x8.

43254—Dam for making freshet for floating logs. Northern Michigan. Size, 5x8.

29358—Vessels taking on cargo at Stern's sawmill. Bangor, Maine. Size, 4x5.

49670—Log boom. Somerset Co., Maine. Size, 5x7.

SAWING DOWN A RED SPRUCE IN THE MINNESOTA NATIONAL FOREST.

51240—Whip sawing timber for sled construction. Cass Co., Minn. 2½x3½.

29353—Slip of mill showing logs passing up, and slipman. South Gardner Lbr. Co., South Gardner, Maine. Size, 4x5.

54610—Mill of the Pacific Lumber Co., at Scotia. Usual output, 200,000 feet per 10 hour day. Humboldt Co., Calif. Size, 5x7.

61131—Taber and Co.'s sawmill. Looking down across boom of logs in the Mississippi, east of mill, from elevator of the mill. Logs came from Minnesota by railroad 90 miles, and by raft the rest of the distance. The logs were used directly from this boom to the mill. Lee Co., Iowa. Size, 5x7.

44167—Showing part of log pond to which the pulp logs have been driven. Pulp and paper mill in background. Lincoln, New Hampshire. Size, 5x7.

31788—General view of manufacturing plant of Brainerd Lumber Co., with refuse consumer in foreground. This mill is considered the best equipped in Minnesota. Crow Wing Co., Minn. Size, 4x5.

29365—View of "brow of mill" from tower, showing runways rolls, platform and cars being loaded with lumber.

LOGGING IN THE ZUNI NATIONAL FOREST, NEW MEXICO.

Ashland, Maine. Size, 4x5.

29401—View inside one of the old side mills still running. Shows rotary saw and carriage (modern); old windlass wheel for hauling logs out of the water with chain; and edges in the distance. Winnegance, Maine. Size, 4x5.

82379—Slasher and trimmer of Gov't sawmill. Menominee Indian Reservation. Neopit, Wis. Size, 5x7.

936—Cut-off saws in Port Blakeley sawmill, small carriage in background. Port Blakeley, Wash. Size, 4x5.

4397—Log passing thru band saw. Berkeley, Va. Size, 5x7.

4398—Live rolls. Berkeley, Va. Size, 5x7.

54850—Yellow pine lumber, showing four grades—from left to right: B or No. 2, A or No. 1, C or No. 3, No. 1 common. Big Blackfoot Milling Co., Bonner, Mont. Size, 5x7.

15461—Looking north over the Town of Millwood, and the "redwood" lumber cut by Sangor Lumber Co. at Converse Basin. The dark piles are big tree lumber, remaining white fir, sugar and bull pine. Sequoia National Forest, Calif. Size, 5x7.

4405—Dry kiln. Berkeley, near Norfolk, Va. Size, 5x7.

66380—A pile of lumber ready to be placed in the air dry kiln. Walton Co., Fla. Size, 4x5.

51264—Kiln drying tupelo. Ionia, Mich. Size 8x10.

23995—Lumbered tract and wasted material. Black Hills National Forest, S. Dak. Size, 5x7.

70538—Stumps showing unrestricted cutting and cutting under Service supervision. Targhee National Forest, Idaho. Size, 5x7.

LOGGING TRAIN ON THE FRANCONIA BRANCH RAILWAY.

81643—Wasteful logging methods. These logs were left to rot within ¼ mile of the Entiat River which is readily drivable. The haul to the river is all on the level, and it would cost very little. These logs are now unfit for lumber of a high class. Washington, Chelan Co. Size, 4x5.

41654—Four breaks in felling 2 big cork pines which scaled over 6M feet each as they lay on the ground. Left in woods 1½ years by careless loggers. Valuable timber wasted. Alpena Co., Mich. Size, 4x5.

64526—View of cut over upland, showing stumps of burr oak and elm. Cut over approximately ten years ago. Franklin Twp., Story Co., Iowa. Size, 5x7.

Forest Types.

44458—Virgin stand of red spruce. (Balsam reproduction on ground.) Spruce height about 90 feet. Diameter 15 to 26 inches. Stand very dense. Mt. Jackson, White Mts., N. H. Size, 4x5.

6094—White oak and chestnut oak on west slope. Wetmoreland, Polk Co., Tenn. Size 4¼x6½.

44451—Reproduction of fir and spruce on Mt. Webster. Elevation about 3,000 feet. Fir predominates. Rotting logs exclusively spruce. Young growth 1—3 feet high. Mt. Webster, White Mts., N. H. Size, 4x5.

SPRUCE LOGS ON SKIDWAYS AND IN POND.
RUMFORD FALLS, MAINE.

LOGS PASSING UP SLIP OF LUMBER MILL.
SOUTH GARDINER, MAINE.

60739—Little Tamarack Lake showing tamarack, hemlock, black spruce, white cedar and hardwoods. North Manitou Island, Leelanau Co., Mich. Size, 5x7.

19174—Group of large spruce, a virgin stand. Squaw Mt. Township, Maine. Size, 5x7.

23082—Virgin forest of sugar maple, beech, basswood and hemlock. Rosecommon County, Mich. Size, 5x7.

44450—Virgin spruce stand about 2,900 feet on very much exposed west slope. Stand very badly thrown by wind. Neighboring trees open, giving good light on soil which is densely covered with fir and spruce reproduction. Mt. Webster, White Mts., Coos Co., N. H. Size, 4x5.

79685—Cypress swamp, Louisiana. Size, 5x7.

53049—Cypress and knees, Jasper Co., Texas. Size, 5x7.

17460A—Twenty-eight year old loblolly pine fully decked stand. 8 to 12 inch D. B. H. Old field. Urania, La Salle Parish, Hadtner Forest, La. Size, 5x7.

21971—White pine forest. Oceana Co., Mich. Size, 5x8.

14161—Dense stand of redwoods on Bull Creek flat. View taken just inside forest seen in 14160. Dyerville, Calif. Size 5x7.

20439—Virgin red fir and western hemlock with occasional giant cedar. Undergrowth vine maple. Timber ranges in diameter 3 to 8 feet and 200 to 250 feet high. Pierce Co., Wash. Size, 5x7.

23561—Large ash in cove near Turkey and Tellico Creeks. Great Smoky Mts., Tenn. Size, 4x5.

19812—Yellow birch 28 inches in diameter and wild cherry 32 inches in diameter. Harlan Co., Ky. Size, 5x7.

54971—White oak hollow, showing standards and veterans of wood. Old and deteriorating trees should be cut out. Many dead and dying oaks, with scattered reproduction of white and red oaks and hickory. Lyon Co., Ky. Size, 5x7.

Individual Species.

60915—Mature red oak in dense pure jack pine reproduction. Grantsburg, Wis. Size, 5x7.

78948—Yellow birch. Size 4x5.

23535—Big white ash. New River, Cumberland Mts., Tenn. Size, 4¼x6½.

8633—Fine black ash, 30 feet high, in park at Garden City, Kansas. (Irrigated.) Size, 4x5.

76093—Typical sand or scrub pine. Locally called "Napp Top" pine. Watson Co., Fla. Size, 3¼x5½.

11426A—A large scarlet oak. Campus of University of North Carolina, Chapel Hill, N. Car. Size, 5x7.

84784—Trunk of typical white birch. Other birches in background. Hot Springs, Alaska. Size, 5x7.

4458—Acorns of chestnut oak on ground. Some are sprouting. Washington, D. C. Size, 5x7.

51100—White ash bough showing heavy fruiting. No. Manitou Island, Leelanau Co., Mich. Size, 5x7.

24093—Trunk of white ash. Jamiaca Plains, Mass. Size, 4x5.

34399—Common form of hemlock with persistent lower branches. Pinnacle Creek, W. Va. Size, 4x5.

19640A—Forest grown hemlock. Cedar Fall Gulf, Hocking Co., Ohio. Size, 5x7.

21725—Famous native boxelder. Circumference 2 feet above ground 12 feet 2 inches, of main trunk above crotch 10 feet, of large branch to left 5 feet 9 inches, spread of top 68 feet. Picture shows tree leafless. Franklin Co., Ohio. Size, 5x7.

34400—Bark and foliage of sugar maple. Pinnacle Creek, W. Va. Size, 4x5.

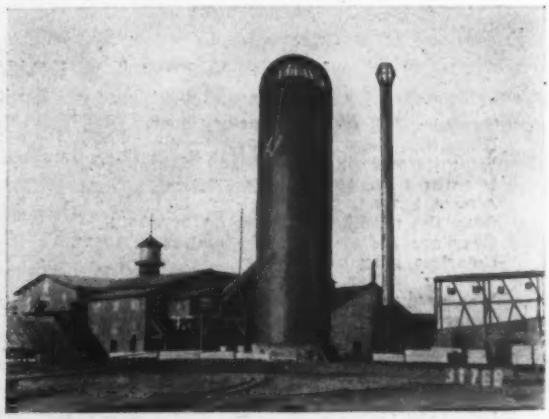
92159—Sugar maple on bank of Apple River. Near Millville, Jo Daviess Co., Ill. Size, 5x7.

68962—White oak scar treated with black paint. (Picture shows bark of tree.) Mt. Vernon, Virginia. Size, 5x7.

19081—White pine along R. R. track near Fox Pond. Forest form of white pine. Hamilton Co., N. Y. Size, 4x5.

354—Winged seeds of basswood, boxelder, elm, fir and pine. New York City, N. Y. Size, 5x7.

"BROW OF MILL"—RUNWAYS, ROLLS, PLATFORM, ETC.
ASHLAND, MAINE.



THE BEST EQUIPPED LUMBER MILL IN MINNESOTA.
Brainerd Lumber Co., Crow Wing County, Minnesota.

FIGHTING THE ENEMY OF THE FOREST—FIRE.
Crew of Fire Fighters at Work in Helena National Forest, Montana.

21338—Sugar orchard. Lamoille Co., Vt. Size, 5x7.

The Work of the Forest Service.

79219—Fighting fire on the Helena National Forest, Montana. Size, 5x7.

16022A—New Forest Service section of Berthoud Pass road. Old Berthoud Pass road on right of picture. New road reduces 21 per cent grade to 6 per cent. Pike National Forest, Clear Creek Co., Colo. Size, 5x7.

13753A—Fire lookout station on the top of Santiago Peak. Cleveland National Forest, Calif. Size, 5x7.

14036A—Measuring flow of river at Big Salmon. Wenatchee National Forest, Wash. Size, 5x7.

92818—Reconnaissance party cruising timber on snow shoes. Sevier National Forest, Utah. Size, 5x7.

93962—Heliograph. Okanogan National Forest, Wash. Size, 5x7.

15376A—Forest Rangers felling dead timber along fire line. Coconino National Forest, Ariz. Size, 4x5.

65245—Forest Rangers taking diameter measurements. Stanislaus National Forest, Calif. Size, 4x5.

80616—Ranger on trail built by Forest Service, Shoshone National Forest, Wyo. Size, 5x7.

10739A—Forest ranger accompanying trapper on his lines to see that there is no violation of the game laws. Shoshone National Forest, Wyo. Size, 5x7.

84855—Washington National Forest, Wash. Government trail below Ruby Creek. Size, 5x7.

74850—The "Devil's Elbow" on the Goat Trail, Skagit River, Washington National Forest, Wash. Size, 5x7.

63640—Rangers constructing telephone line. Plumas National Forest, Calif. Size, 4x5.

84338—Boundary marking on the Boise National Forest wherever it is intersected by a public road. Idaho. Size, 5x7.

84719—Sheep bridge across Mill Creek, Lassen National Forest, Calif. Size, 4x5.

75695—Black's Fork Bridge nearing completion by Forest Rangers. Uinta National Forest, Utah. Size, 4x5.

Teachers of botany and biology will find many other titles of interest and value, and especially the exhibits more recently prepared on Forestry and Nature Study.

These exhibits are arranged in twelve panels of four pictures each, and illustrate the following subjects: two common kinds of trees; how the trees grow; the bark; tree buds; leaves and flowers; fruit; forms of trees; influences affecting tree growth; some of the forests found in the United States; enemies of the forest; friends of the forest; other creatures that live in the forest. Each series is mounted in panel form with eyelets for hanging. The exhibits will be loaned on the same conditions as the other traveling exhibits.

GRAY MATTER.

Gerrit A. Beneker.

Towering tall from the factory floor,
Rises this massive machine.
With its whirring wheels and clanking cogs
It presses the steel sheets gray,—
Almost human, you say.
Gray the machine, and the factory, too;
Gray are the men and the matter in them,
Colorless gray matter they.
In gray matter minds, mechanical,
Was dreamed this powerful press.
Before it was born into being
An artist devoted designed it.
Steel from a fiery furnace,
Poured molten into smoldering molds,
Formed its ponderous proportions,—
Each pin, bolt, nut and rod.
It took gray matter, too, to assemble;
To true up and square up each part.
Gray matter in the power that drives it,
In the care it demands from men.
But how useless this mountain of gray matter
Unless, in the heads of the men who control it,
Is gray-matter molded by God.

THE CHANGING AIMS OF THE INDUSTRIAL ARTS

Clarence Everett Howell, Supervisor of Industrial Arts, Public Schools, Lincoln, Nebraska

I HAVE just returned from a trip which carried me from the central west to the Atlantic coast and back, visiting the schools of seven prominent cities on the circuit, and what I found has left me wondering.

I am wondering as to the exact status of the industrial arts as exemplified in these seven educational centers. I am wondering just how one might analyze the various conditions, and from them possibly forecast some tendencies in school shopwork.

It seems that just now we are in a tremendous transition stage, whether consciously or unconsciously, I do not know. The old methods have been tried and found wanting. Educators are questioning the correctness of our industrial work as it now exists in the schools. In the background stands the old, formal manual training, and in the foreground the later productive—activities type,—each the extreme opposite of the other.

The movement typified by the Smith-Hughes law seems to have reached its crest, so far as the city schools are concerned. Men of the profession have been quick to recognize that the majority of our school children do not wish to be highly trained for one definite trade, and could not economically be so trained if they wished. The restrictions thrown about Smith-Hughes classes by the barring of the elective academic student of the cosmopolitan high school, has effectually shut off federal aid from the majority of such schools.

But there is a more significant spirit stirring. Some schools are still using more or less of the old formal type of shopwork, some have gone in for production and "real factory" conditions, but here and there are indications of an entirely new purpose, of shopwork used neither for the formal development of hand skill, nor for the trade skill purpose, but for a vitalizing, educating, illuminating factor which will crystallize and energize the academic knowledge the pupil may acquire.

So far, it seems to me, we have been turning education the wrong way about. We have taught mathematics as mathematics, geography as geography, and science as science, with very little reference to the application of these subjects. This statement may sound trite, but there is an underlying significance which we have been slow to appreciate.

Why is it that a boy who has spent years studying arithmetic will take his first job in a grocery store, and prove unable to add a bill of goods correctly? Isn't it for exactly the same reason that, when he comes into the school shop, he seems unable to figure board feet accurately? He has been taught arithmetic as a theoretical and abstract proposition, and when confronted with the reality, either in the grocery store or in the school shop, he is stumped.

Just the other day a teacher asked me, "How much arithmetic are we supposed to teach the boys in the shop?"

Well, there you are! This teacher thought that the boy should have been taught arithmetic in his arithmetic classes, and that the shop teacher ought not to have to bother with it. Was he right? Was there justice in his complaint?

And what about English? Do you think very many boys would pass a good examination on the kind of English they use in the shop?

And yet isn't the shop, or the laboratory, or the kitchen, or the sewing room, or the real activity room, whatever it may be called, the nearest approximation to real life which we have in the school, and, consequently, the logical proving ground for most theoretical information?

For many years now, the socalled academic subjects have been given primary position in our schools,—the three R's are still considered the most important,—and the shopwork has been incidental, more or less extravagant, an interesting side show, as it were. If the student has time left from his other subjects, let him take shopwork. If he is a failure in everything else, put him into shop. If there aren't funds enough to go around, build the main building first, and let the shops wait for the present. Or, if school finances press too hard, cut off the shopwork, and concentrate on the good old three R's.

Luckily, our ideals are changing, and as our ideals change, so will our practice. The time is already near when conditions may be exactly reversed, when the activities subjects, such as shopwork, will occupy the place of first importance in our school program, and the academic work will be secondary.

Is this too radical? I ask you what other better field is there for learning than by doing? Of what use are theories if they are not applied? Why juggle figures on a blackboard if you cannot add the family grocery bill at the store correctly?

Just the other day the principal of a school questioned the accuracy of calling my particular province in the schools the Industrial-Arts Department, because she felt that the Fine Arts Department was already teaching some industrial arts, and that the schools were using the industrial arts in phases of their school work other than the shops.

Our geography committee is planning the use of shop equipment in working out concrete problems in the study of the resources of the world, and the industries, and the history committee plans visualizing the study of the history of the human race. Down in the lower grades the so-called "free activities" are coming into vogue.

The influence of the kindergarten is spreading up-

ward, and the resources of the shops are reaching downward.

Don't you see what it means, the significance of all this over-lapping of interests and activities? In real truth, "Industrial Arts" is getting to be a term too big and broad for just one department. And it is right that it should.

With all this, there is a change equally significant in the shopwork itself. Some cities are beginning to use the shops, not for the sake of the projects which may be turned out, but for their effect upon the life and character of the child. There is a vast and essential difference here, the difference between a machine-like skilled laborer, and an intelligent artisan. The difference between the class system of Germany, and the equal-opportunity freedom of America. The one molds the human to material ends, whereas the other fashions materials to human needs.

Concretely, some schools are doing away with shopwork as such below the seventh grade, and are letting the lower grade *boys and girls together,* work in such related materials as will serve to visualize and vitalize their academic studies. Thus they may work in clay one day, in raffia the next, and in foods the third. Their object is not skill, but information. Indeed, some educators like to use the term "industrial information", and it seems appropriate in many ways.

Carried into the junior-high school, this same spirit takes on a more definite search in the seventh grade, when it turns the allotted shop periods into short experiences with a variety of materials, the industrial information beginning to shade off and combine to a slight extent with the beginnings of manipulative skill.

Thru the eighth and ninth grades this process continues, with a gradual tendency more and more towards an industrial choice, until in the senior high school, real choice of a vocation, and specialization therein, may be made with a fair degree of intelligence.

But even here the relating possibilities are too pregnant to be neglected. In the senior high school also, the shops and laboratories may be made the proving ground for academic knowledge gained, and the vitalizing, motivating influence for research and study. Who is there who really believes that the time will ever come when the majority of senior high school students will be taking shopwork with an eye to ultimately entering a trade? Is it not true, rather, that our larger task will be with the boys and girls who are stimulated to greater effort and a keener interest by the opportunity to deal with real materials and real situations, and thru them become truly educated for the problems which follow graduation?

JACOBEAN FURNITURE

Leslie G. Martin, Philadelphia, Pa.

The furniture style known as Jacobean was developed in England during the reign of James I, A. D. 1603-1625 and of Charles I, who occupied the throne from A. D. 1625 to 1649. The furniture which was developed from A. D. 1649 to 1660 is known as Cromwellian, and that of the following reigns of Charles II from A. D. 1660 to 1685 and of James II, A. D. 1685 to 1688, is spoken of as Jacobean or Carolean.

The furniture of this period which followed the Elizabethan showed a distinct change in style. The decoration of the period generally was applied with carved or moulded effects which produced high reliefs. Geometric panels as well as architectural details and lozenge patterns were used.

During the reign of James I, the furniture in the great houses was very luxurious, and cushions of tapestry and velvet were used with rich wall hangings of tapestry.

In the reign of Charles I, the furniture was still very costly and depended largely upon its upholstery for decoration. The tables showed the Elizabethan influence altho the melon bulb type of leg was more restrained and was used on small tables which had arches spaced between the legs with pleasing effect. The later tables were more graceful with an "X" shaped stretcher and bulbous feet.

Regard for utility is a feature of Jacobean furniture. The chest was an important piece. It was made with many variations. Some chests were plain with panels indicated by means of carved groups and others were simply ornamented with applied mouldings which gave them a dignified appearance.

Some types of chests had a carved frieze decorated with a Jacobean beading around the top and were ornamented with inlay on the lower rails and panels. The socalled nail-head or pyramidal projections were also used in chest decoration as were grooves and notches. The nail head pattern was generally used around the top and ends. The feet of chests were generally made globular or egg shaped. A rounded arch with a carved floral frieze and strapwork was sometimes used for decoration.

The joiners work of this period was excellent. Much of the work was done with such simple tools as the gouge and joiners' chisel. The construction was strong; the mortise and tenon joint was employed. The tenons were fastened with wooden pegs.

The whole effect of Jacobean furniture was dignified and restrained. A decoration of drops or pendants of acorn shape was used extensively. The split balustrade effect was employed. The pieces were made from spindles turnd on a lathe, sawed longitudinally and then glued on or fastened with wooden pegs to the body of

the piece of furniture. Geometric panels when used were composed of mitered mouldings worked in squares, lozenges, stars and oblongs. These were combined in squares or oblongs containing a lozenge shape or squares with an "L" shaped moulding in each corner.

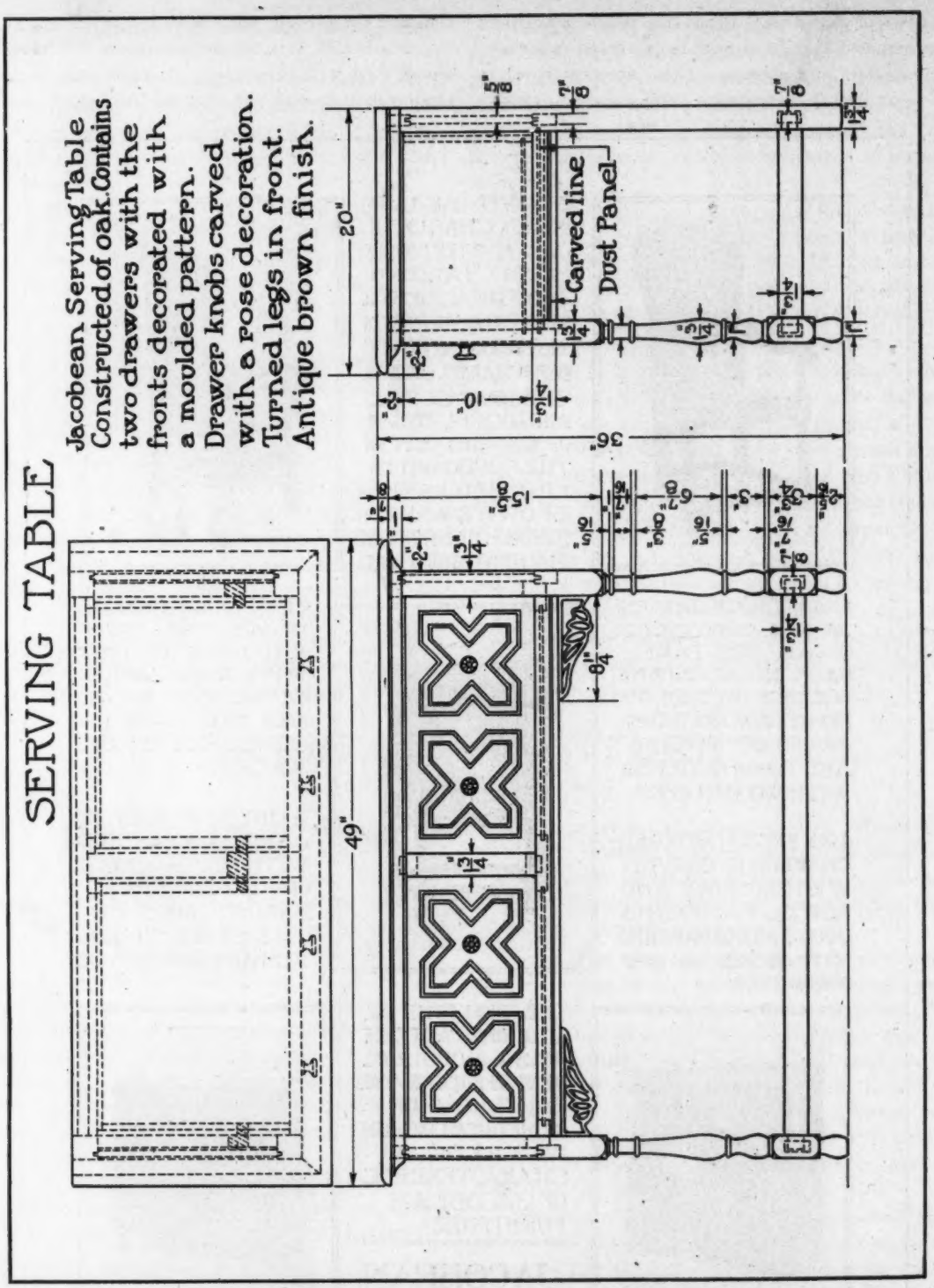
Chairs came into general use during the reign of James I. Oak was generally used for their construction and the carving was simple but effective.

Stools also were becoming common and were of a simple form with turned legs. Conventional carving of strapwork or grooves was often used to decorate them.

Day-beds were of a graceful type. They were without arms or back but had an adjustable head rest.

The Jacobean Court Cupboards were carved with

3. CARVED OAK CUPBOARD. CHARLES II. CARVED WITH DOUBLE SCROLL PATTERN AND FLORAL DESIGN. THE LEGS & STRETCHER ARE DECORATED WITH DEEP CHANNEL GROOVES. THE DRAWER PULLS AND LOCK PLATES ARE OF WROUGHT COPPER THE CUPBOARD IS FINISHED DARK BROWN & WAXED. STRONG CONSTRUCTION. TURNED LEGS IN FRONT.
1. ARM CHAIR, JAMES 1ST -1603. CONSTRUCTED OF OAK. THE PANEL BACK IS CARVED WITH LOZENGE PATTERN. THE FRONT LEGS ARE TURNED. JOINTS ARE MORTISE AND TENON FASTENED WITH WOODEN PEGS.
2. ARM CHAIR, CHARLES 1ST, 1625. THE SEAT AND BACK ARE CANE, WITH SCROLL CARVING ON THE STRETCHER AND BACK. THE CHAIR IS CONSTRUCTED OF WALNUT.
4. OAK PRESS CUPBOARD, CHARLES II.- CARVED WITH LOZENGE AND SCROLL PATTERNS. DOORS ARE ORNAMENTED WITH ARCHES AND DEEP GROOVINGS.
5. CHEST OF DRAWERS. JAMES II. ORNAMENTED WITH MOULDED DRAWER FRONTS AND SPLIT BALUSTRADES ON THE STILES. METAL PENDANT DRAWER PULLS.
THE DIAMOND OR LOZENGE PATTERN WAS A POPULAR DESIGN FOR CARVING. PANELLING OF GEOMETRICAL DESIGN WAS ALSO A CHARACTERISTIC OF JACOBEAN FURNITURE.
JACOBEAN FURNITURE

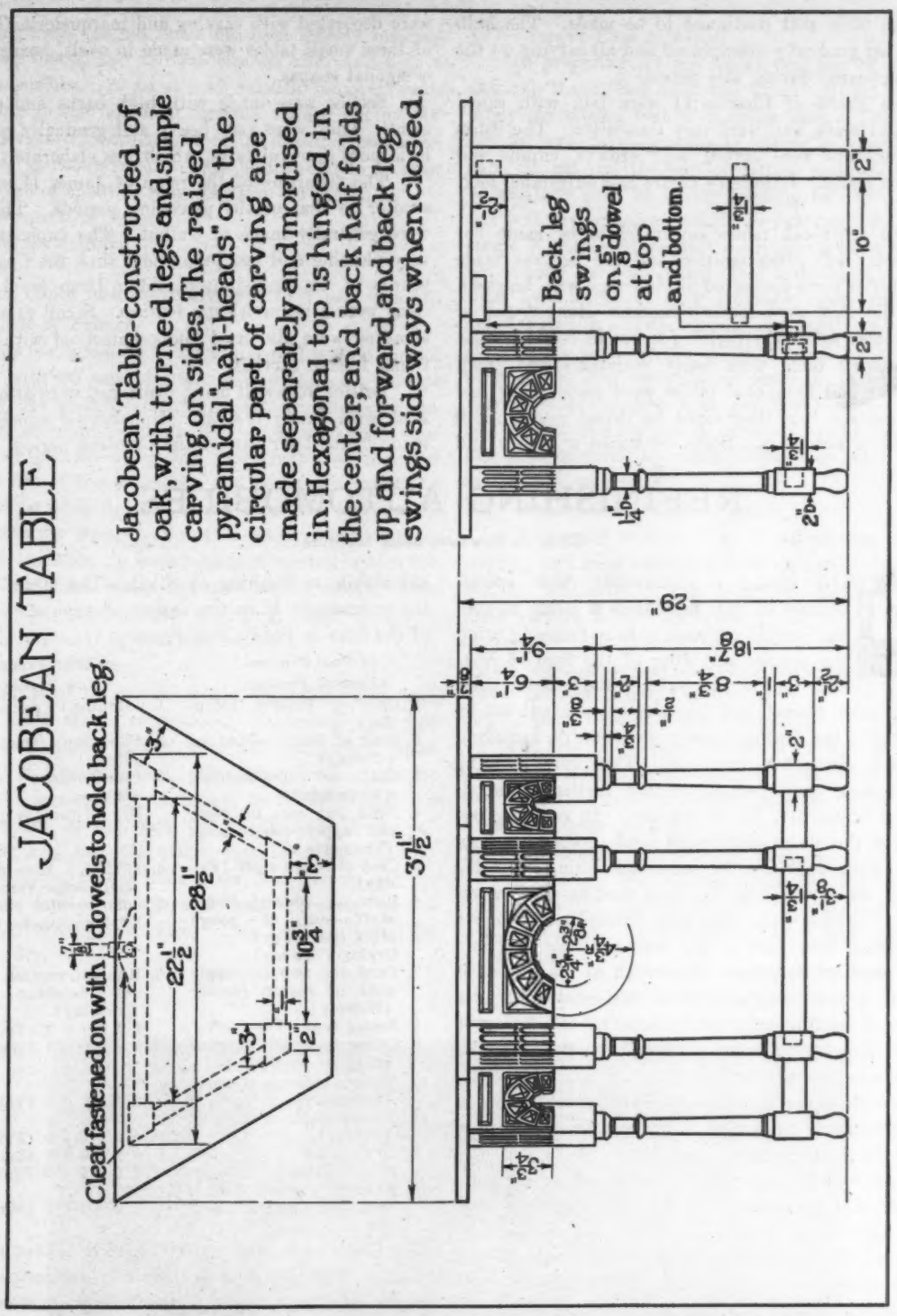


lozenge shaped patterns on the panels and deep groovings on the stiles.

Some were used as food cupboards and had perforated panels, while others had panels and drawer fronts decorated with raised mouldings, arches and interlaced strapwork. The early types had no stretcher. The drawer and door handles were sometimes of wood with carved decorations and others were of metal.

The Jacobean dressers were decorated in a similar manner with split balustrades and mouldings. The back legs were usually straight but on the later ones they were twisted. The split balustrade was sometimes carved.

The chest of drawers was developed from the chest


JACOBEAN TABLE
Jacobean Table-constructed of oak, with turned legs and simple carving on sides. The raised pyramidal "nail-heads" on the circular part of carving are made separately and mortised in. Hexagonal top is hinged in the center, and back half folds up and forward, and back leg swings sideways when closed.
Back leg swings on 5/8" dowel at top and bottom.
Cleat fastened on with 1" dowels to hold back leg.
29"
37 1/2"
22 1/2"
28 1/2"
10 3/4"

and contained various numbers of drawers, some with plain fronts and ring handles and others with ornamented fronts.

Bed-steads were simple in construction and were decorated with fan shaped carving on the head and foot board.

During the Commonwealth or Cromwellian period the furniture became more simple. Spiral turning was used considerably, and chair backs and seats were covered with leather. Some chairs had a scroll effect at the top and others had graceful pierced carving. Narrow caned panels were also used. The legs were shaped like a letter "S" and the stretcher was carved and pierced.

The table still continued to be made. The bulb shaped leg gradually disappeared and all carving on the leg disappeared during this period.

The chairs of Charles II were tall, with caned backs and seats, and were very decorative. The backs and stretchers were carved with crowns, cupids and acanthus leaves. Children's chairs had adjustable foot-rests.

The large oak tables continued to be made but the drawer was often omitted and the leg was made in a baluster form connected to the frame with brackets. Later the legs were made straight. Many types of small tables were constructed for use in coffee houses. The gate-leg table with many variations and small triangular and hexagonal tables were made. They had the advantage that they could be folded into a small space when not in use. Some contained a drawer and were decorated with carving and marqueterie. The tops of these small tables were made in ovals, hexagons and octagonal shapes.

Settles were made with high backs and panelled arms. They were very heavy and gradually gave way to a more graceful form, which was elaborately carved.

The furniture of the reign of James II, was very similar to that of the preceding periods. The chairs were generally made of walnut. The cupboards were very pleasing and less pretentious than the Court Cupboards of the preceding periods. Drop jewel decorations were a characteristic feature. Scroll carving and arcading were also used and ornamented with conventional foliage carving.

Settles were still being made and were often decorated with grape designs. Upholstered couches were made in the later part of the Carolean period.

REFINISHING AUTOMOBILES

Clyde A. Bowman, Stout Institute

THIS spring in connection with special courses in auto mechanics a group of men has carried out some auto re-finishing using the primer and filler of the Empire Varnish Co., of Cleveland, Ohio, and the color varnish, color enamel, and finishing varnish put out by a number of the varnish firms of the country, including Valentine, Stewart-Mowrey, etc. This work is being planned as a course supplementary to that in wood-finishing under Mr. H. O. Grubert. In carrying out this work the eleven-coat rough stuff process has been used on some work and the six coat finishing using the Empire primer and filler has been used on other work. Some of the cars which have been finished using the six coat method have been in use twelve months now and are in excellent condition. Inasmuch as the process is one that is now being adopted in full production in a number of leading automobile factories, and has gone past the experimental stage, it is probable that those industrial-arts teachers who are handling courses in automobile re-finishing in connection with automobile mechanics would be interested in the specific steps carried out in the shops at Stout Institute.

As is well known to those who have done any automobile re-finishing success in the work rests to a large extent upon three factors:

First, the selection of first class, tested material and absolutely proper and correct conditions.

Second, skill in brushing on material.

Third, skill in rubbing.

In the finishing of automobiles there has been a constant effort to reduce the number of coats. There has also been constant effort to build up a sufficient body of non-porous material for leveling the surface, consisting of elasticity and toughness. Earlier finishes on the better class of cars runs as high as 22 coats. The following tabulation presents two methods used in automobile re-finishing at Stout. The significance in the comparison is in the saving of time thru the use of the filler in the six coat process.

11 Coat Process. (Present Process.)	*6 Coat Process.* (New Process.)
1. Coat of Primer (Monday).	1. (Monday) Coat of primer.
2. Coat of Glaze knifed on (Tuesday).	2. (Tuesday) One coat of filler.
3. Coat of half-and-half (Wednesday).	3. (Wednesday) Coat of filler.
4. Sand out coat of glaze and apply rough stuff (Thursday).	Dry (Thursday).
5. Coat of rough stuff (Friday).	4. (Friday) Rub filler and apply color varnish.
6. Rub out (down) rough stuff—coat of rough stuff (Saturday).	5. Color varnish (Saturday).
Drying (Sunday).	Drying (Sunday).
7. Sand out, re-putty, apply coat of sealer (color) (Monday).	6. Rub out varnish and coat of finishing varnish (Monday).
8. Sealer coat (Tuesday).	0 0 0 0 0 0 (Tuesday)
9. Color varnish (Wednesday).	0 0 0 0 0 0 (Wednesday)
10. Tinted rubbing varnish (Thursday).	0 0 0 0 0 0 (Thursday)
11. Tinted Rubbing Varnish (Friday).	0 0 0 0 0 0 (Friday)
Dry (Saturday).	0 0 0 0 0 0 (Saturday)
Dry (Sunday).	0 0 0 0 0 0 (Sunday)
12. Rubbing out and coat of finishing varnish (Monday).	0 0 0 0 0 0 (Monday)

Sample pieces of material have been bent partially, twisted, then returned to their original position for as many as a dozen times, without the finish showing the slightest checking, cracking, buckling, or any tendency whatsoever to give way. In the process itself there are places where it must be frankly admitted that skill is necessary for a satisfactory finishing job. The following tabulation takes the six coat process step by step and suggests certain cautions which should be made for painters or for students using the process for the first time. It is understood that previous to the

following steps the old finish has been thoroly removed from the metal, and the job cleaned and sanded to a smooth surface. A paint and varnish remover made according to the following formula worked out by Mr. H. O. Grubert, instructor, in metal finishing and wood finishing at Stout Institute, has been found to be most productive of speed in removing this old finish:

Two parts of Benzol
One part alcohol
remover

One ounce melted paraffin wax to 1 *gal.* remover.

(1) *Coat of Primer.*

This is allowed 24 hours to dry and is then sanded lightly with 00 sand paper. All of the coats except possibly the sixth or finishing coat, are the color the car is to be when finished. This is an advantage over the other process using the eleven coats as the first four or five of the eleven are not usually the color the car is to be when finished. It is advisable, however, in a job finishing shop where a wide range of shades must be kept available, to have standard neutral colors for primer and filler which are used on all colors. This prevents the necessity for having in stock a variety except in the color varnish and enamel.

(2) *Coat of Filler.*

This is to be spread evenly, smoothly, and with as few brush marks as possible. Beginning with this coat the excellence of the work depends largely upon the skill of the individual. The fewer brush marks he makes the less rubbing there will be to follow and the smoother will be the work. If on the body of the car there are any bad file marks this filler has unusual adaptability in that a little extra filler can be put on over these bad file marks and then be rubbed as tho none had been put on extra. This coat is allowed 24 hours to dry.

(3) *Second Coat of Filler.*

In preparing for the second coat use 00 steel wool and rub the surface to a dull finish. Clean it off and apply the second coat of metallic filler. This you let dry for two days—practically having a double coat to rub. It requires the best of cutting material that can be created—such as burlap rubbing ball or any good felt will give quickest results in rubbing. Always use single F pumice stone as the surface is hard and does not require the best skilled labor to bring this metallic filler to a surface. Any ordinary husky rubber can get the results. If in rubbing any spot should be cut thru to the metal, it should be touched up with color as near the original color as possible. Always use a good binder in going over and touching up. When this is dry, the surface is in condition to receive the first coat of metallic rubbing enamel or color varnish, as the case may be.

(4) *Application of Color Varnish.*

The second coat of filler is rubbed out with the rubbing ball in a manner similar to the description in No. 3. Following this rubbing out the first coat of color varnish is applied. While this is the first coat of color varnish, it must be remembered that the preceding three coats may also be of the same color. This coat is allowed 24 hours to dry.

(5) *Second Coat of Color Varnish.*

The first coat of color varnish is rubbed out with 00 steel wool and oiled sand paper. Following this the second coat of color varnish is applied. This coat is allowed 24 hours to dry.

(6) *Application of Finishing Varnish.*

The second coat of color varnish is rubbed out with grade "F" pumice stone. The finishing varnish is then applied. This is allowed 48 hours to dry and is not rubbed.

CHAIRS BROUGHT TO THE MANUAL ARTS SHOP, ST. JOHNSBURY, VT., SCHOOL TO BE RECANED. (See pages 319-20.)

THE TEACHING OF HYGIENE

R. W. Tarbell and J. J. Metz, Apprentice Instructors, Central Continuation School, Milwaukee, Wis.

THE teaching of hygiene has undergone radical changes in the last few years. A search thru the dusty retreat of unused bookshelves will reveal texts on physiology, rapidly becoming obsolete. In their stead we find modern books on hygiene, telling the great story of how to keep well. More of the sprit of social welfare is found within their pages. They aim to start the path of health at each one's doorstep, and fill the entire journey of life with vigor and strength.

That there may be no mistaken idea as to what we mean by this change in treatment and method of instruction, let us compare very briefly the old and the new, in what the child terms physiology.

Those who have been teaching for several years will readily recall the lessons they tried to learn while in the grades. Who does not remember the old questions as to number of bones in the body, the location and use of the tibia, ulna, radius, phalanges, periosteum, etc., etc., *ad infinitum?* In the light of experience and mature judgment, who is ready to say that it does much good for a child to con over such pages and forget it all again, without gaining the basic instruction on health preservation?

Turning now to the present day courses of study, let us see what improvements have been made. The texts are written in more understandable language. Less of the technical names are found. Unnecessary memorizing is being eliminated. The theme of the text is clean living and better health, rather than a diagnosis and examination of the body.

Let us sum up the merits of the old and the new and give to each its full credit. Some will defend the old, because they learned it that way, and it gave them a good working foundation. This is true of a few, but the majority gleefully laid the subject by. For those who expect to pursue some advanced work in physiology this type of instruction is essential. But let us put this one test to the subject, as we find it in the curriculum: What is its purpose? When we come to realize that hygiene should be taught, not for classical improvement nor academic ideas, but to teach the child how to live, then we are aware of its usefulness.

The writers of this article have spent a number of years teaching in industrial schools, and will present some ideas that have proven successful in their classes. With proper modification they can be applied to other kinds of instruction. Health talks, as we may call them, must be couched in language that the child will understand. They must be prepared according to the needs of the pupils, both in point of age and locality. It is more essential to instruct children in their present needs than in the needs of adult life. Also, it would hardly be advisable to lay much stress on prevention of diseases which appear only in distant parts of the world.

Instruction for young men in industry, serving as apprentices, or helpers and also for older men, is different from that used for grade and high school pupils. The method of approach must be modified to suit the intelligence, attitude and daily lives of such classes. The period of formal training for these people is largely past. School work may be irksome to them and they are a bit impatient about learning things that do not appear to bear directly upon their work. Each lesson should be a rule of action which will work in practice. The teacher ought to plan his lessons to suit the sum total of conditions as he finds them.

With so many new ideas arising, both as to content and method, it may appear a bit perplexing to know just what preparation an instructor should have for teaching hygiene. Also, in the industrial and continuation schools of today, the question of gathering material for lessons must receive due consideration. The teacher must view his preparation from a different standpoint from that of the average business man or mechanic. His training should include an ample amount of the older type of physiology lessons, the more the better. His grounding in the subject must be thoro enough to ensure him a safe leeway for emergencies and unexpected questions. He may gather material for his lessons from the industries represented in his classes, from seasonal afflictions to health, from reading standard periodicals on the subject and from bulletins issued by the city health department. There are numerous textbooks on hygiene containing valuable outlines and suggestions.

A moment ago we condemned the physiologies of yesterday. In the belief that destructive criticism should be followed by suggestions for improvement, it should be said that a course in hygiene should include such topics as seasonal hygiene, colds, influenza, etc., how colds may be materially reduced, if not entirely avoided. There should be lessons on the proper care of the body in the daily routine, care of teeth, the question of bathing, the results of improper clothing, of irregular and intemperate eating, late hours, prevention of constipation and avoidance of industrial poisons. The plans should find a place for instruction in calisthenics, for demonstration and explanations in first aid to the injured, general operation and care of the nervous system, as well as other topics of a practical nature.

All teachers are interested in the question of method, or how to best transfer their knowledge of the subject to the minds of the pupils. In the teaching of hygiene the instructor must not only know what is best to include in his outlines, but must also be concerned as to how much he can "put across" to his classes.

His preparation for teaching should enable him to know what the best books contain, and he should have access to the latest bulletins and periodicals. The lesson may be presented in part by hearing a recitation from an assignment in the text. This, however, should always be supplemented by discussions and explanations. If the class is mature enough, a lesson can be well taught by means of a lecture, setting forth certain facts and drawing conclusions in a logical manner. Time should usually be given, however, at the close, for a discussion of the topic, at which time the class may be encouraged to ask questions. For certain types of classes an informal discussion will secure the best results. The instructor may begin by telling a story of how a person fell ill, because of some unhealthful conditions, and then by artful questioning draw out certain facts before his pupils and drive home the moral. Charts may be used quite frequently in many of these exercises, and may be the standard colored type, prepared for such work, or improvised crayon pictures drawn for the occasion. It does not seem necessary or advisable to dwell much on these, because of the effort to avoid physiological and anatomical discussions. Also, some people may become too morbid and introspective and inclined to worry about their health, if made familiar with the intricacies of the human body and the possibilities of sickness. The chart may be used to clarify a statement in the discussion. Thus, if the instructor is demonstrating the binding of a severe cut in the arm and wants to make it clear that the arteries are deep seated, whereas the veins are more on the surface, a colored diagram will assist in his explanation very materially. The method of presentation must also take cognizance of the time allotted to the subject. If a definite class period is assigned to this work and a certain amount of subject matter is to be completed, the plans must be laid accordingly. In ungraded classes and in some industrial schools the time may be varied. Sometimes ten minutes is sufficient for a health talk, and again twenty minutes may be required to effectually cover a lesson. It is necessary of course to decide this according to the conditions at hand.

Let us take a topic in hygiene and give in condensed form the material for the lesson. Assume that we have a class of apprentice boys ranging from 17 to 21 years. The lesson is to last twenty minutes. The subject is to be "Digestion of Food." The instructor takes time during his lecture, or before starting, to sketch a diagram of the alimentary canal, to show the path of the food thru the body. He then proceeds in this manner.

"Boys, I want to say a few things about how food acts in the body, and how sickness may be prevented, by obeying the laws of nature. You will notice that food, when swallowed, drops immediately into the stomach. Have you ever swallowed something hot and felt it burning all the way down? You wanted a drink of cold water to cool it off. Do you know that some of the latest ideas concerning cancer of the throat and gullet tell us that it is caused by swallowing too hot food? It is thought that the food scalds the tender lining of the gullet and may leave a scar, which will later start a growth and become a cancer. In passing, let me caution all of you not to swallow anything too hot.

"The food remains in the stomach about four hours, during which time it is being broken up and mixed with the proper juices for digestion. It then passes to the small intestine, as you will see by the chart. Notice that the small intestine is very long, about twenty feet, and about an inch in diameter. The food passes slowly thru this long tube, requiring about ten hours to make the journey. During this time the juices of nutrition are being absorbed by the walls of the tube and delivered to the blood.

"At the end of the small intestine you will notice a junction is made with the large intestine. This tube is more than two inches in diameter and about five feet long. The purpose of this one is to absorb some of the food juices that may remain and to gather the waste matter for the purpose of casting it out of the body. You will observe there is a little appendage attached to the large intestine, close to the junction with the small one. This may become inflamed and cause appendicitis. If the waste matter from the food remains in the large intestine too long, it becomes decayed and may cause serious trouble. Even tho we may be very careful about eating clean food, we are continually taking germs into the mouth. These follow the food path and finally lodge in the intestines. If the waste products are delayed and continue to decay, the germs will find this an excellent ground for colonization and will thrive rapidly. What are the results? The germs may infect the entire system and bring on sickness. If the germs of influenza settle in the intestines, a constipated condition will permit a rapid growth, until in a short time a feverish pulse and headache indicate the approach of the "flu". Our physicians tell us that many of the common attacks of sickness are started by constipation.

"Again, if the waste remains in the large intestine too long, a self-poisoning may result. The absorbing power of the tube will continue to take up the juices and will also act on the products of decay by taking the poisons into the blood.

"How are we to avoid this affliction which is bothering so many people? How can the average shop man prevent constipation, without spending money on medicine and doctors' fees? Let us see. When a physic acts on the intestines it may clear out the central part of the waste, but leave the outer edge clinging to the walls. This is much the condition we would have if a rubber hose were filled with clay and then a hole bored thru the clay from end to end of hose. The rim of clay would adhere to the walls of the hose. The condition

would be relieved but not removed. Something must be done to throw off the waste which clings to the walls. If we bend and twist the hose the clay will become loosened and fall thru. Likewise, by bending, twisting and other proper exercises of the body we may loosen the waste and prevent constipation. This is sound doctrine, and in line with the advertisement showing how our grandfathers averted constipation by sawing wood. The moral points to daily exercise as a great preserver of health.

"Constipation may also be avoided by a proper attention to the food we eat. Rich diets of pastry and even white bread may cause a tight packing in the intestine, making an obstruction difficult to remove. Coarser foods, such as bran, vegetables, fruits, etc., taken in proper amounts, will serve to prevent this congestion and aid materially in overcoming trouble.

"Now boys, the more we think about the matter, the more it becomes apparent that the health of each person is largely in his own hands. Daily care in the matter of eating, exercising and rest will work wonders in keeping up the physical well being. It is abundantly worthwhile to obey these simple laws and be repaid with a clear head, clean complexion, good appetite and a lively step."

The lesson is supplemented with questions and discussions and is ample for one assignment. The classes manifest great interest in this kind of instruction, for it is of a practical nature and bears immediately upon their health and happiness.

We believe this method of teaching can be applied to the graded schools, as well as to ungraded pupils. Even though the schedule calls for the completion of a text within a certain time, necessitating assignments each day, still the actual job of teaching may be done by the above method. Let the pupils have the assignment of a topic to learn, but when the recitation time arrives, do not deaden the period by merely "keeping school", while you have the children rise and recite. Enliven the hour by a bit of interesting discussion, and the pupils will show increased interest in their work.

It appears sometimes that one way of testing the worth of a subject, in the school curriculum, is to note the reception it enjoys at the hands of the pupils. If they like a certain kind of work, we are apt to think it is good for them, and that we are successful in teaching it. There is undoubtedly an element of truth in this belief, altho we should not pin our faith entirely to the efficacy of such a method. We can, however, judge the success we are having in *teaching* the subject, by the interest displayed by the class.

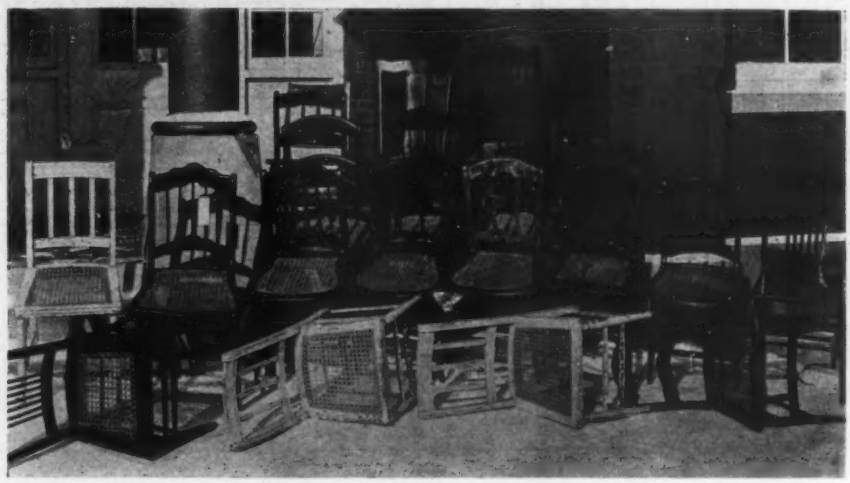
It is becoming more apparent, as our school systems are attempting to pursue a safe and sane policy, that a subject must demonstrate its usefulness or be cast out. With this gage in hand, how shall hygiene stand the test? Shall it continue, as in the past, to occupy a place in the curriculum and receive only perfunctory treatment? Shall we endeavor to bring our classes up to a passing knowledge of the subject, and rest content when they can glibly recite the lesson? This is a part of our education which should not be regarded as a classic, something to be pursued as "art for art's sake." If it is at all worth while it must prove its case by its effect on the lives and health of people. Why should not hygiene instruction spread beyond the classroom and become part and parcel of the entire community? Why cannot the school act as a center of distribution for the latest and best advice on matters of such great public concern? When people are finally aroused to the point of understanding that sickness can be largely prevented, and the general tone of health and well being raised, by applying the laws of hygiene, then the subject will receive due credit.

School administrators are often put at a disadvantage by the illness of teachers. Putting this on a percentage basis and striking a sum total for any school, the question arises, "Can this percentage level be raised?" Can the individual instructor avoid many of the seasonal attacks of sickness and have a more efficient year to his credit? If he cannot apply his health talks to himself, how does he expect them to work with others? Isn't it high time for us to recognize thoroly that the instructor should be the embodiment of what he teaches? He ought to be an example of what he professes to know. He should be able to say to his class in hygiene, "These rules work well with me and I practice them daily."

Many people would think that the fountain of eternal youth had been reached if they were forever free from colds. It is a matter of such vital importance that it seems well to say a few words about it. We are all aware of the fact that people are more susceptible to colds at one time than at another. Exposure to a draft may have little if any effect, or it may bring on a severe attack. We are also quite agreed that the cold is a germ disease and therefore contagious. It appears likely that the germs are flying about continually and are more or less present in our systems during the season when colds are prevalent. How, then, do we catch a cold and how can it be avoided? Apparently the condition of the body has a great deal to do with it. Many people are engaged in occupations which do not cause perspiration. The pores are supposed to throw off waste products, which we may call poison. If this poison accumulates in large quantities a person is in a potential state for taking a cold, and the least exposure may start it. Then, if the quantity of poison is large, it may require sometime to clarify the system. In breaking up a cold many people resort to a Turkish bath and steam it out. Then, with proper care, it soon disappears. If the steam bath will break it up and free the body of poison, after a cold is contracted, it ought to clear up the system before the attack. This is, in fact, what happens. A thoro steaming out, every week or two, will almost entirely prevent a cold. In some cases a slight cold appears occasionally,

but is rather in indirect ratio to the baths. A cold bath and rub down should follow the steam bath, after which a two hour rest should be taken in bed, or, if convenient, for the night. This method of cold prevention is not mere paper talk. It has worked out so successfully that it can be recommended to any normal person.

What shall we set as the goal of hygiene teaching? Manifestly it must be better health for all. We must view the instruction as a great safeguard thrown around our community life. People must be taught that sanitation is a duty of prime importance, and that clean living and care in combatting disease is a cardinal principle of good citizenship. Physical upkeep rests largely with ourselves, and it should be deemed a fault to be continually ill. Training should begin with the child and continue thruout life. Greater cooperation with health officials must be developed. In all these matters the instructor can wield a powerful force and help to bring about the extermination of disease.



CHAIRS CANED IN THE AUTHOR'S CLASSES FOR CITIZENS OF ST. JOHNSBURY.

CHAIR CANING

Leon H. Baxter, St. Johnsbury, Vt.

THIS form of handwork is both interesting and profitable. It may be correlated very artistically with furniture design. Seat weaving has proven very beneficial to those afflicted with nervous disorders as it is fascinating and forms a very soothing pastime.

As a seventh grade problem, brought into the shop course about the middle of the year, it has proven itself an interesting diversion from the regular bench work.

The cost of cane has increased considerably since 1914, before the war prevented us from receiving our usual foreign supply. At that time cane could be purchased for 75 cents per hank, while at the present time a quality inferior to that formerly obtained costs from $1.80 to $2.00 per hank.

In St. Johnsbury the boys are notified, about ten days prior to a certain date, that they should seek out a chair, at home or among their neighbors, that stands in need of caning. From the time of the announcement until the date specified it is a common sight to see several boys on their way to school, each day, with chairs of various sizes, shapes and ages, upon their heads.

The boys first whittled out pegs from scrap wood of a size to fit snugly in the small holes in the chair. The old cane is removed with a sharp knife and the holes are cleaned out.

The cane intended for use is soaked from ten to twenty minutes in warm water to make it pliable.

As the caning process for hand woven chairs is clearly demonstrated in the accompanying drawings, no further comment need be made here, except that after the chair is completed, the fine, hair-like fibres may be removed by sanding lightly with fine sandpaper. A coat of varnish adds to the finished appearance.

This project proved so popular that the school received a great demand, from the townspeople, for boys to do caning for them. This extra work was done at the homes of the various boys.

Many boys made considerable spending money by this method and two in particular, who put up a sign in front of their homes, stating that chairs would be caned by them, made over $25 apiece in a little less than two months' time.

Many chairs were brought in whose seats are machine woven instead of the usual method whereby the cane is run thru the small holes about the inside rim of the chair. These have a slot or groove about 3/16 inch wide running around the inside chair rim about 3/4 inch from the inner edge.

PLATE 1.
A.
THE SEVEN STEPS IN CHAIR CANING
wooden pegs
A D E H L LO
B C F G J K
Run end of cane thru A about 2" and hold by peg. Run across and down thru B pulling tight and holding with another peg at B. Move peg each time to insure tightness
FIG 1.
METHOD OF TYING THE CANERS KNOT.
#1 is the new piece of cane which is placed down thru the next vacant hole. #2, which is the old strand, is twisted around #1 and then #1 is slipped thru the loop. (Fig C) and pulled tightly against the chair bottom (Fig C)
#1
#2
A
B
C
The smooth, glossy side of the cane should always be upward. Avoid twisting the cane and pull strands fairly tight so that they sing when snapped. Try and avoid tying too many knots. Soak the cane in warm water for five or ten minutes, before using and dampen from time to time while caning. Use the medium size cane for weaving and for step #7 use binding cane. See drawing D for further suggestions

This kind of seating comes in rolls of various widths, in both close and open weave, and costs about 65 or 70 cents for enough for one ordinary size chair. A piece about two inches larger all around than the seat of the chair to be caned should be purchased.

After removing the old cane from the chair bot-

PLATE 4
Finishing the Binding
Continue the binding until the hole next to the starting hole is reached. Raise the first loop in the medium cane and slip the binder under and thru loop next beyond. Trim binder even with edge of the second loop
Tied Cane Binding Cane.
The binding cane may be started at any point altho it is customary to begin where the last diagonal finishes. Lay binding cane X over the holes and bring the medium cane Y up on one side and down on the other as shown. Keep the medium cane pulled very tightly.
FIGS. 6 AND 7
Cane is obtained from India, Ceylon and China and is put on the market in hanks containing about 100 feet and at the present time costs about 1.75 per bunch. It can be obtained of most school supply houses and one bunch will cane about four ordinary sized chairs. One bunch of binder cane will bind a great many chairs.
Cane should be handled carefully as it cracks and splits easily.
Some chairs are machine caned, i.e. the cane comes in rolls and is put in the required size is placed over the chair bottom and wedges of wood are driven in to slats in chair bottom, thus holding the cane securely in place.
If such a chair as this is to be caned, holes must be bored in the seat, generally on the place where the old cane was inserted. The cane holes are usually 3/16 in diameter, 3/8 from edge of the opening and from 1/4 to 1/2 apart, according to size or weave desired. If is a good distance to have between centers of holes. If the chair is wider in front than in the rear, count the holes in both places. For example, if there is 17 in back and 19 in front start caning from the left rear hole and go to the second hole in front. If there were 15 in the rear and 19 in front, cane from left rear to the third hole in front.
Neat skewers make good pegs for holding the cane.
It does not pay for anyone to cane a chair for less than 75¢ and as the chairs increase in size so should the price increase in proportion
PLATE 3
Always keep on side from strand in step 2 toward back of chair
Starting to weave at A go over the under strand K, and under top strand Y. Returning from C the step is under Y and over X
FIG 4
Fasten cane here by slipping under one of the strands on under side of chair
RIGHT
WRONG
Starting the diagonals at A run strands under step 1 and over 2 and 4. Care should be taken to follow this order throughout. If the cane does not lay straight some mistake has been made. Be sure cane runs into the squares and not between pairs
FIG 5

tom, including the spline, which holds the cane in the groove, the new piece of cane should soak in warm water for about fifteen minutes to soften the fibres. While this is being done, prepared glue, which is sold on the market in cans, should be spread fairly well into the groove with a wedge shaped stick.

The wet cane should then be placed over the chair opening, arranging the crosswise strands exactly parallel with the front and rear edge of the chair, and having the projection equal on all four sides.

Wooden wedges are a necessary part of the caning equipment for this type of chair and three or four, of widths varying from ½ to 2 inches, should be prepared. These wedges may be made out of quarter-inch hardwood, about four inches long and taper from a quarter inch thick at the top to about an eighth at the bottom. A wooden mallet is also a necessary tool.

The wedge should be placed on the cane directly over the center of the rear groove and struck smartly with the mallet until the cane is driven to the depth of the groove.

This operation should be repeated to the left and right of the starting point, then it should be repeated at the corresponding points of the front groove. Do this until the seating is firmly in place in both the front and rear groove. This insures even tension.

The same method is employed in placing the cane in the left and right grooves. Rounded corners are done last with a narrow edge.

The ends of the cane now stick up and project beyond all outside edges of the groove, and must be removed.

This is done by carefully cutting them with a sharp chisel and mallet, being careful to cut just below the outside edge of the groove.

Glue should now be applied in the groove on top of the inserted cane and then the seat is ready for the placing of the spline, which permanently holds the seat in place and gives a finish to the whole operation.

The spline is a wedge shaped piece of wood or reed, of standard size, for fitting into the groove and should be set lightly into the groove to determine just the length needed, after which it should be cut with a chisel. The joint should come in the center of the rear groove, and should be forced in flush with the surface of the chair with the mallet.

After the cane dries out the seat should stretch as tight as a drum head and, if ordinary care is taken, should be free of all "puckers".

Seats caned with the woven prepared cane, can be completed in from 45 to 60 minutes, while the hand weaving method will require quick work if completed in six or seven hours by the beginner.

Fig. 2 shows one lot of completed chairs successfully put into usable shape.

COURSES FOR RECONSTRUCTION—IV

SWITCHBOARD OPERATING

C. R. Miller, Williamson Trade School, Williamson, Pa.

Summary of Course—Twelve Months.

DURING the first three months the work covers the elementary principles of switchboard operating. Classification of various electrical machines, etc., is taken up, together with wiring, small equipment, first principles of applied electricity, and operating on the school board.

English and vocational mathematics are carried thru the entire year, the outline for this work being the same as was outlined for previous courses. Freehand orthographic projection is covered in six months.

During the second three months, a detailed study of D. C. equipment is taken up. Analyses are made of typical commercial switchboard installation as related to direct current service, storage battery practice, and operating is done on the school board in connection with study of applied electricity.

During the third three months the work relates particularly to the handling of alternating current service on the board. A study is made of A. C. equipment in general, with analysis of typical commercial board installation. Particular attention is paid to switch gear of the open and oil types. Operating is continued.

During the fourth three months detailed study of A. C. equipment is introduced. Alternator, rotary converted mercury-arc rectifier, with a study of connections are covered. Operating is done on school board, introducing synchronizing practice, using lights and synchronescope. The following texts are used in this course:

Vocational Mathematics, Dooley.
American Electricians' Handbook, Croft.
Switchboards, Baxter.
Elements of Electricity, Timbie.
Effective English, Claxton & McGinnis.
Electrical Machinery, Croft.

First Three Months' Operating—24 Hours Per Week.

This work is planned to develop the students' ability and knowledge of power plant apparatus as related to the operation of electrical equipment. It consists of detailed study of equipment in the plant, taking notes and making designated arrangements of apparatus. Apparatus arranged is put into operation. When the student is sufficiently advanced to take the responsibility he is assigned to operating the school switchboard.

First week. Study of various machines for purposes of recognition; generators; motors; differentiation as to size; turbines; reciprocating units; rheostats; ammeters; voltmeters; wattmeters. A brief note is written in the notebook describing the machine in a general way. This note should be sufficiently comprehensive to enable the learned to recognize the piece of equipment upon reference to the notebook.

Second week. Detailed study of machines, starting with a D. C. generator. Base, frame, poles, pole pieces, armature, commutator, brush rigging and all

other parts are studied carefully. A simple sketch and a note, descriptive of each part, are entered in the notebook. This study covers the generator, motor, rheostat, switches and fuses. There is no duplication of sketches, e. g., a motor need not be completely re-sketched as it is similar in a general way to the generator.

Third week. Detailed study of the rheostat, mechanical and electrical arrangements. Applications in school plant, both in field circuit of generator and for motor regulation; sketches and notes descriptive of the circuits studied.

Fourth and fifth weeks are devoted to studies of switch equipment as outlined in Baxter's Switchboards. A study is made of the text relating to switches.

Sixth week. The work consists of setting up an operation of simple D. C. generator circuit as shown in Fig. 2, Baxter's Switchboards. All material presented in this text is studied.

Seventh week. The student sets up an operation of a simple three circuit board, served by a single D. C. generator, Fig. 12, Baxter's Switchboards.

Eighth week. The student connects D. C. generators in parallel. The set up is as shown in Fig. 16, Baxter's Switchboards.

Ninth and tenth weeks. A study is made of typical arrangements of instruments and switches, Baxter's Switchboards. Comparison is made with installation at the school plant. A diagram of the school plant switchboard is sketched.

Eleventh and twelfth weeks. Operation of board at school plant—keeping service on the board at proper time. Cutting in and cutting out the units serving the plant; starting and stopping the prime mover; paralleling D. C. generators on the service board.

Elementary Electricity—2 Hours Per Week.

Text: Timbie's Elements of Electricity.

The student studies all of chapters 1, 2 and 3 except the work in mathematics; chapter 4, omit from bottom of page 73; chapter 7, problems omitted; chapter 8, problems omitted; chapter 10, descriptive material on transformers only is taken; no mathematical work.

Small Equipment—3 Hours Per Week.

This work is intended to acquaint the student with the various small fittings used in power-plant practice. It consists of a detailed study of the standard small equipment found in the market.

Classification and trade specification, as listed in the standard catalog of a large supply house in a neighboring city is used. The following small equipment is studied in particular: Lamps, sockets, receptacles, attachment plugs, snap switches, switch boxes, knife switches, cut outs, fuses, lamp cord, moulding, tubes, cleats, insulators, fiber conduit, metal conduit, armored conductors, wiring fittings, switch boxes, taplets and condulets, brackets, clusters, shades, guards, expansion bolts, rheostats, dimmers, push buttons.

In taking this work the student should see a piece of each equipment studied and should understand its use in the power plant.

Wiring—4 Hours Per Week.

Text: American Electricians' Handbook by Croft.

This work is intended to give the student a knowledge of the common forms of wiring met in electrical work. The various tables and standards required for modern construction are presented under this heading:

Table of decimal equivalents.

The micrometer caliper; reading and method of use.

The wire gauge; reading and method of use.

Abbreviations relating to wire gauges.

Comparison of wire gauges.

Study of unit sectional area of wire: the circular mil; how calculated.

The properties of wire.

Classification of wire as related to covering: S. B. R. C., D. B. R. C.

Weather proof and slow burning wire.

Duplex wire and cable; cable classified according to covering S. B. W. P., T. B. W. P.

The various joints; each joint to be made up by learner.

Bare copper splice, properly taped.

Single wire splice properly taped.

Tapping, ordinary, and knotted tap.

Conductor taps.

Lugs, purpose, practice in soldering lugs.

The student should take the work intimately correlated with plant practice. Each piece of wire studied should be seen; the sections of covering should be opened, and various layers observed. The wire gauge should be used on various diameters of wire until the student is perfectly familiar with its use. The same statement applies in using the micrometer. A study of the wire gauge table is made.

Operating—24 Hours Per Week.

Second three months devoted to D. C. practice.

First two weeks. The generator, chapter 7, Timbie's Elements of Electricity. Section 2, Croft's Electrical Machinery.

In connection with this work the student starts and stops generator; he must know the type of winding on the generator operated (shunt or compression); he is required to operate compression wound machines in parallel; he sets up a generator to excite the field from an outside source.

Third and fourth weeks. Motors, chapter 8, Timbie's Elements of Electricity are reviewed. Also, he studies section 3, Croft's Electrical Machinery. The student sets up and operates a shunt motor as indicated in Fig. 86 of the text. All parts of motor and devices relating to the project are studied in detail. The text is studied with constant reference to the equipment in the plant. Each piece described in the text is studied in the plant if the equipment is installed.

Fifth week. Troubles of D. C. motors and genera-

tors. Selected problems from Croft's Electrical Machinery are applied to motors and generators and effect is noted. The fault is to be corrected, and the machine is to be put in proper operation in each case. Armature testing, using both bell and telephone receiver is done.

Sixth week. The mechanical construction of motors and generators is studied, including bearings, oiling systems, etc. Typical construction of a number of school machines is sketched in the notebook.

Seventh and eighth weeks. The Storage Battery, American Electrician's Handbook: Careful study of the text; all terms analyzed; rules for operation are studied; practice in mixing and placing electrolyte, charging cell, putting into service, and operating is included in this unit. A small lighting circuit should be so arranged that it may be operated from the storage battery. The battery is arranged so that it can be charged from a generator in operation, and the generator so connected that it may operate a lighting circuit or charge battery. The project consists of charging storage battery, operating lighting circuit from the generator, throwing lighting circuit on battery, shutting down the generator. Storage battery as presented in Timbie's Elements of Electricity is studied in this connection. Chemistry of the work may be omitted.

Ninth week. Switchboard Construction, Baxter's Switchboards. The work is correlated with the school plant equipment and all material in the text is studied.

Tenth, eleventh and twelfth weeks. The three wire system. Croft's Handbook; Timbie's Elements of Electricity; Baxter's Switchboards.

The system is carefully studied as a whole; all practical features are taken up in detail. Circuit is arranged and operated as shown in Fig. 13, Baxter's Switchboards.

Elementary Electricity—2 Hours Per Week.

Timbie's Elements of Electricity.

Chapter 5, Mathematical work is omitted.

Chapter 13, Mathematical work is omitted.

Chapter 14, Descriptive material, such as is necessary for a practical understanding of the instruments used in the power plant, is studied.

Chapter 10, Material on Inductance, omitting mathematical work.

A general review of the Elements of Electricity closes the second three months' period under this heading.

Wiring—4 Hours Per Week.

Croft's Handbook. Pole lines, selection of poles; methods of setting. All diagrams are studied; details must be well understood. Each piece of equipment is to be inspected. Line construction about the school plant is studied. Conduit construction on the outside line work is taken up. Alternating current installation is omitted. Interior wiring; study of underwriters' rules. Standard symbols; standard screws and toggle bolts; loom and its application; underwriters' installation. Service entrances and other wiring switches; study of school installation. Service entrances and other wiring details relating to interior wiring as outlined in the text. Studies relating to wiring in special industrial plants; packing houses, flour mills, chemical works, dry kilns, metal refineries, conduit as applied to interior wiring, conduit fittings. The student should bend and connect up a sufficient amount of conduit to assure a proper knowledge of its use.

Third Three Months.

The time during this period is devoted to alternating current work.

First and second weeks. Management of alternating current generators, section 7, Croft's Electrical Machinery. The study of the A. C. circuit is taken up on the school board. The student should learn to start and to place in service a single alternator. The simple circuit shown as arranged for synchronizing in Fig. 190 of Croft's text should be made up and operated. Synchronizing dark and light is studied. Practice is given in synchronizing dark, using the lamps. The student must note the use of two synchronizing lamps in circuit, and apply the same in practice.

Synchronizing with the synchronescope. In the operation of these steps, a small circuit should be connected up, having several lamps and this circuit should be run from the alternator.

Third, fourth, fifth and sixth weeks are devoted to the principles, construction and characteristics of A. C. generators. Section No. 6, Croft's Electrical Machinery, and Timbie's Elements of Electricity. The text is carefully studied in relation to machines in the school plant. Principles of phase development are studied; diagrams are analyzed and a phase graph for a coil of a three phase alternator is drawn. This graph must show a diagrammatic sketch of the armature and coil in relation to the pole piece and related notation explain coil position and wave form. A study of excitation and of the method of exciting the alternator is made at the school plant. A diagram is drawn, illustrating the method of exciting the school alternator. Notes are written explaining the diagram drawn. The solution of all the problems in section 6 of the text is required, except those involving the use of advanced mathematics. The relation between K. V. A. and wattage ratings is to be well understood.

In using Croft's and Timbie's text jointly, the assignment should be made to the text giving the simpler explanation to start and to be followed by the more difficult text.

Seventh, eighth, ninth and tenth weeks. The induction and repulsion motor. Careful study of section 8, Croft's Electrical Machinery. All problems not requiring advanced mathematics are to be solved and various graphs are carefully analyzed. In practice an induction motor should be connected up and operated; a diagrammatic sketch of a motor is made with a sketch of connections, the same to be entered in the notebook.

Beginning at this time, the student should be as-

signed four hours a day to general electrical repairs about the plant. This continues thruout the remainder of the course. The development of the student's ability in applying, in a practical manner, knowledge gained in classes, is the purpose of the assignment.

Eleventh and twelfth weeks. Synchronous motors and condensors. Study of section 9, Croft's Electrical Machinery; study of text and diagrams. Applications are made of principles learned in operating alternator at school plant as a synchronous motor.

Fourth Three Months.

Four hours each day are assigned to practice thruout this period. The practice is along the following lines:

Electrical operation in the power plant.

Electrical repairs about the school plant.

Electrical installation about the school plant.

Experimental work in the power plant as outlined in the following paragraphs.

The remaining four hours each day are devoted to text study correlated with the test program as given herewith, in such a manner as to assure the greatest development of the student.

First two weeks are devoted to a careful study of section No. 10, Croft's Electrical Machinery. Diagrams are carefully analyzed and practice connections are made as shown in the various drawings of the text. Motors are to be operated on these connections. Section No. 11, dealing with troubles of A. C. machinery should be studied during this period. The remainder of the time in the course, exclusive of the practice periods, is devoted largely to testing. As each test is made the student should observe the following details:

Sketch to be made of the disposition of the apparatus.

Log of test made up.

Sketch of all circuits involved in the test.

Description of purpose of test and results obtained.

Any necessary graphs to be worked up.

All material must be neatly arranged on sheets fitting a standard notebook.

The second, third and fourth two weeks, the following tests should be made:

Synchronous impedence test of A. C. generator.

Load test of a three phase generator.

Prony brake test of an induction motor.

Test on rotary converter to determine losses when operated, by D. C. and using A. C. on the service line.

Connection of and putting in service of the mercury-arc rectifier. Diagram of connections for this device are drawn and filed in the student's notebook.

The remaining weeks of the period are devoted to transformers. The text is section 5, American Electrician's Handbook. The various types of transformers are studied, and all diagrams are carefully analyzed. Special stress is put on star-and-delta connection. Diagrams are studied showing the detailed arrangement of the apparatus. Transformers should be connected in star-and-delta, and an experimental lighting circuit operated from the same, as each type of connection is made up.

Polarity test of transformer using a voltmeter.

A study of constant current transformer is made and application of the same in a circuit; a test is made for constancy of output. No drawing instruments are required.

Related Work in Drawing—2 Hours Per Week.

No drawing instruments are required.

Sheet No. 1:

(1) Horizontal lines parallel.
(2) Vertical lines parallel.
(3) Angular lines parallel.
(4) (One section to right).
(One section to left).
(5) One space sectioned.
(6) Four circles.
(7) Two elipses.
All of the above freehand.
(8) Draw an angle and bisect it with instruments.
(9) Same with protractor.
(10) Sketch Fig. 137, P. 131.

American Electrician's Handbook, put in notes.

(11) Same, Fig. 138.
(12) Same, Fig. 139.
(13) Same, Fig. 142.
(14) Same, Fig. 147.
(15) Same, Fig. 5, P. 161.
(16) Title.

Sheet No. 2: Devoted to the principles of projection.

Problem 1: Front, top and end view of a cartridge fuse.

Problem 2: Front, top and end view of a cap screw; conventionalize threads; obtain screw from power plant.

Problem 3: Front, top and end view of copper fuse. P. 422, Electrician's Handbook by Croft.

Problems 4: Front, top and end view of conduit nipple, P. 481, Croft's Handbook.

Problem 5: Front, top and side view of a wiring cleat; put in all working dimensions.

Problem 6: Front, top and side view of a transformer stand, P. 635, Croft's handbook. Call attention to sectioning poles, and explain meaning. All dimensions entered.

Problem 7: Front, top and side view of a small knife blade switch; put in all dimensions; sketches of details where necessary.

Problem 8: Drawing of D. C. armature, P. 195, Croft's Handbook to be made; all parts named; parts not named in text, drawing to be looked up in power plant and properly titled, with indicating arrows. Attention is called to the introduction of sectioning. The end view of the armature is shown.

Problem 9: Diagram 201, Croft's Handbook to be drawn. All parts titled. A brief note explaining the purpose of each piece of apparatus shown in this sketch is to be entered in the student's notebook. The drawing is to be made in close correlation with the power plant. All work in drawing is to be freehand sketches and inked in freehand.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

CRITICS AND THE COMPULSORY PART-TIME-WORK.

ONE of the strangest things in the present day educational discussion is the attitude of the so-called "regular educators" and teachers of academic subjects toward the provisions for compulsory part-time school work.

While professing a half-hearted approval of the part-time work, these people condemn it with all manner of inelegant phrases such as "a Prussianized system", "commercial exploitation", etc. They seem either not to know or entirely to disregard the fact that the compulsory part-time provision is the only educational plan yet seriously proposed for the education and advancement of the millions of boys and girls who from some cause or other have left school to go to work.

These critics of the part-time scheme, having been unable to hold the boys and girls in school or to give them any adequate assistance looking toward the efficient performance of any sort of work outside of the school, seem by some mysterious process of reasoning to resent the attempts of any other agencies to do for the young workers what the schools so long and so lamentably failed to do.

For the boys and girls who are now working and who, *under the law are permitted to work*, the part-time school is, for the present, the only hope. Of course, this is not the ideal arrangement. It is a pity that a great system must be devised to take care of the waste product of another great system. Neither was the old regime which either drove the children out or at least failed to hold them, an ideal arrangement. But the fact is that millions of these young workers are out of school and that the part-time classes are the only means yet devised to meet their needs. They cannot wait for years while theorists sit and quibble over the problem. Those who condemn the work of the part-time school and who have themselves admittedly failed, should have something to offer besides condemnation or else they should favor us with a good deal of silence.

Another pitiable fact is that apparently most of the academic educators who talk and write about the part-time work have the peculiarly queer misinformation that the work of the compulsory part-time classes is wholly and narrowly vocational. If they should reverse their usual procedure and investigate before talking or writing—well, we find ourselves becoming too optimistic. At any rate, they should be informed that the overwhelming percentage of the compulsory part-time work is of the continuation or general improvement type. That is to say that most of this work is academic in character and is largely taught by the very same people who teach the regular high school classes. This last is a fact which does not always insure the kind of instruction adapted to the needs of the classes, but experience and time may remedy the defects. Hence, in a very large measure, the critics of such work are condemning the only plan which offers the young workers, the school authorities, and the teachers another chance to do something for the unfortunate boys and girls which the schools under the old regime failed to do!

"DEMOCRACY" WORKED OVERTIME.

EVERYBODY seems to have a recipe for "democracy." Almost every article on any subject rings in some sort of a plea for something or other for the security of "democracy."

Recently, some occupants of pedagogical easy chairs have established beyond their own doubt that anything savoring of vocational education was beyond the pale of "democracy", and in lengthy and belabored arguments "proved" that the only straight road to "democracy" lay through the labyrinth of "traditional classic education for all."

Democracy to such minds seems to mean that all people must be treated alike without regard to environment, natural aptitudes, native handicaps, peculiar conditions, or any other considerations. Such a theory applied to medicine would dictate the same doses of the same medicinal concoctions for measles and mange, tetanus and typhus, apoplexy and appendicitis, tummy ache and tuberculosis.

Any sane notion of democracy does not necessarily mean *the same treatment* without regard to particular conditions; *it means equality of opportunity in the light of particular conditions.* It means *equality* of opportunity; not *identical* opportunity. Democracy thinks of the individual to the last man. Such a scheme as would impose the same absolute restrictions upon all without qualification entirely ignores the individual and becomes the very essence of autocracy. No scheme of education calling itself "democratic" can ignore the individual aptitudes, environment, aspirations, and impediments.

By all means let us educate for democracy; but let us do it by taking advantage of the inherent qualities of those we educate and by giving that variety and richness of choice and training that will meet the needs of the various individuals whose combined wisdom, power, idealism, purpose, and freedom constitute a democracy.

PROFESSIONAL COURTESY.

A TEACHER from a small Wisconsin village writes to the state department a pertinent suggestion on a point in professional courtesy. She writes:

"Many teachers do not leave an outline of the work completed during the school year. A new teacher

is at a great disadvantage, unless she knows what work has been accomplished and what her predecessor's aims were. Besides a natural curiosity to know how the work was carried on the previous year, a teacher cannot do full justice to her pupils, unless she knows what foundation work they have received. Let us all make a resolution, if we have not already done so, to never leave school at the end of the year without making a detailed outline of the work that has been covered. It is nothing more than practicing the golden rule."

Every teacher who comes for the first time into a school has a sense of helplessness that is inevitably deepened by the absence of any indication of the work that has gone on before. In business, no employer would think of starting an employe in so helpless a fashion.

INFLUENCE OF HIGH COSTS.

PERHAPS the greatly increased cost of machinery and other equipment will have a wholesome influence, after all, upon the shopwork of the schools. It will at least emphasize the necessity for pressing every article of old equipment into use and for using the entire equipment with a maximum number of students a maximum number of hours per week.

Numerous places will continue to suffer from hopelessly inadequate facilities for work. Nevertheless, in many instances, schools will be saved by exorbitant prices from the danger of purchasing equipments far in excess of their needs.

A visit to some of the most noted trade and industrial schools in the country impresses one with the simplicity and unpretentiousness of the equipments. On the other hand, a visit to some of the so-called technical high schools, where only manual training work is attempted, impresses one with a kind of bewildering elaborateness. One can scarcely resist the feeling of disappointment in comparing the extravagant equipments with the almost negligible output.

If the high cost of equipments can only serve to bring wise judgment and discriminating choice into buying and a sane appreciation of values in capacity use of equipments, it will not have been an unmitigated evil.

LET THEM GO!

There seemed early in the spring to be signs of a general and permanent exodus from the teaching profession, but we now believe that many valuable teachers will not make a permanent change to trade or industry. One reason for this belief is our faith in the business sagacity of the American citizen, who will not allow good teachers to leave the schools permanently for need of suitable pay.

A second reason for our confidence that good teachers will remain teachers is that they have become good teachers by faithfulness, persistence, and intelligence. Having these qualities of faithfulness and persistence, they will exercise them on the present situation. The *good* teacher will remain faithful to the obligations of the teaching profession. The *good* teacher will persist under temporary disadvantage. The *intelligent* teacher will realize on meditation that a radical change in occupation is highly speculative, even in America, and that only the few succeed in games of chance.

A third reason for our confidence that *good* teachers will remain in the schools is that those who leave for a temporary increase in salary are probably not the best teachers. Let them go! The schools may better have a few faithful teachers than many who are merely teaching for what they can make out of it. The situation of the present year will clear the schools of some who are unfitted for the teaching profession by that incentive which we condemned in the profiteer. Let us hope that when they would return, the need of their services will have passed.

INDUSTRIAL ART AND VISUAL EDUCATION.

THERE are great possibilities in the use of moving pictures. Children may see at a glance just how the commodities of life are prepared. They may have mountains and mines, volcanoes and chasms, brought to the school room. The life of the universe may be displayed before them with absolute realism. They may be as sated with visions of what humanity is doing and looks like as the most experienced traveller, and they may become as self-satisfied in that superficial experience as the habitual globe-trotter, to whom nothing is new or interestng.

On the other hand, they may be inspired by some of these visual experiences to take an active personal interest in some one of the many activities presented. This is a most fortunate inspiration, and if followed up with the opportunity thru industrial art to exercise themselves in some personal service for humanity, they would be insured against that ennui to which the superficial information subjects them. Information easily acquired is like other easy acquirements: held lightly and easily dispensed with. In a word, information, visual or verbal, is not of great value unless it functions in the life activity and service of the individual.

Too long have we held to the delusion that a cultured person is a well informed and capable person. Culture finds expression in the exercise of information and abilty. Let us not only learn by doing but serve thru doing. Industrial Art presumes information, ability, and service.

Get leave to work in this world,—'tis the best you get at all.—*E. B. Browning.*

Our grand business is, not to *see* what lies dimly at a distance; but to *do* what lies clearly at hand.—*Carlyle.*

All true work is sacred; in all true work, were it but true hand-labor, there is something of divineness.—*Carlyle.*

Blessed is he who has found his work; let him ask no other blessedness. He has a work, a life purpose; he has found it and will follow it.—*Carlyle.*

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

PROBLEMS IN HARNESS REPAIR.

I—Attaching a Buckle with Rivets and the Riveting Machine.

By Louis M. Roehl, Instructor in Farm Shopwork, New York State Agricultural College, Ithaca, N. Y.

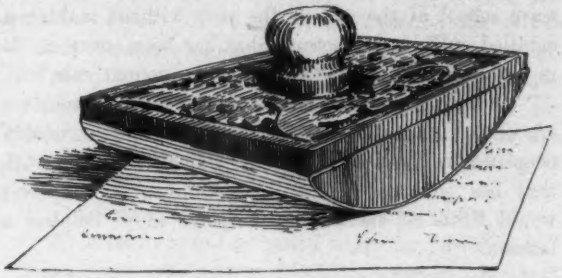
The attaching of buckles is one of the simple and frequent jobs which the farmer must perform in keeping his harnesses in good condition. The following outline covers the essential steps:

1. Place the strap on the workbench with rough or flesh side up, and with the round knife or jack plane skive about two inches of the end to a wedge shape.
2. With straight or round knife or jack knife taper the end as shown at A in the accompanying illustration.
3. Punch two holes with the belt punch about 1" apart, the first one about 2½" from the end of the strap, as shown at B.
4. Fold the end back so that the holes line up and hold firmly with the left hand; then cut an opening into the folded end to receive the tongue of the buckle as shown at C.
5. Place the buckle on the strap as shown at D.
6. Drop a tubular harness rivet in the riveting machine with the head down; place the strap in the machine with the cut end up as shown at E, and drive the rivet in place. The first rivet should be placed close to the hole.
7. Place another rivet near the end of the strap as indicated at E. In placing the second rivet don't let the buckle end of the strap drop down or the end of strap will not fit tightly against the strap in the finished job.
8. With a small brush swab on enough edge ink to blacken the newly cut leather.

A HAND CARVED ROCKING BLOTTER.

C. H. Richert and Otis Philbrick, Rindge Technical School, Cambridge, Mass.

The ordinary flat sheet blotter is as irritatingly elusive as the proverbial collar button. Attached to a rounded piece of wood and equipped with a handle and



A ROCKING BLOTTER MADE IN THE AUTHORS' CLASSES.

carved top it loses its tendency to be misplaced and becomes a practical, efficient and highly ornamental piece of desk furniture.

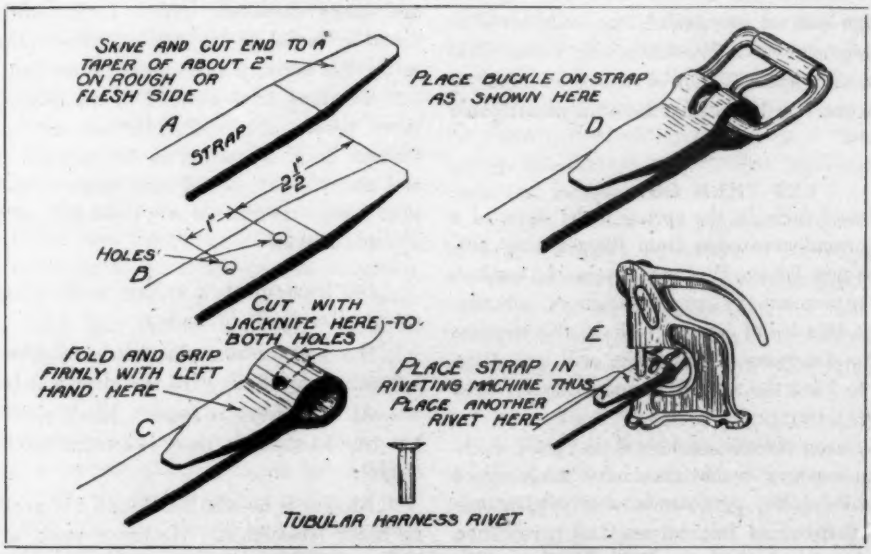
The working drawings given are sufficiently clear to be followed without written directions. Oak is a little more difficult to carve but is more substantial than most woods; white wood, gumwood and mahogany may be used. Avoid a glossy finish by rubbing the piece with linseed oil and one-third turpentine.

Several designs for knobs are shown; in designing others try especially to break the whole height into proportions pleasing to the eye. Avoid dividing into halves or other equal divisions.

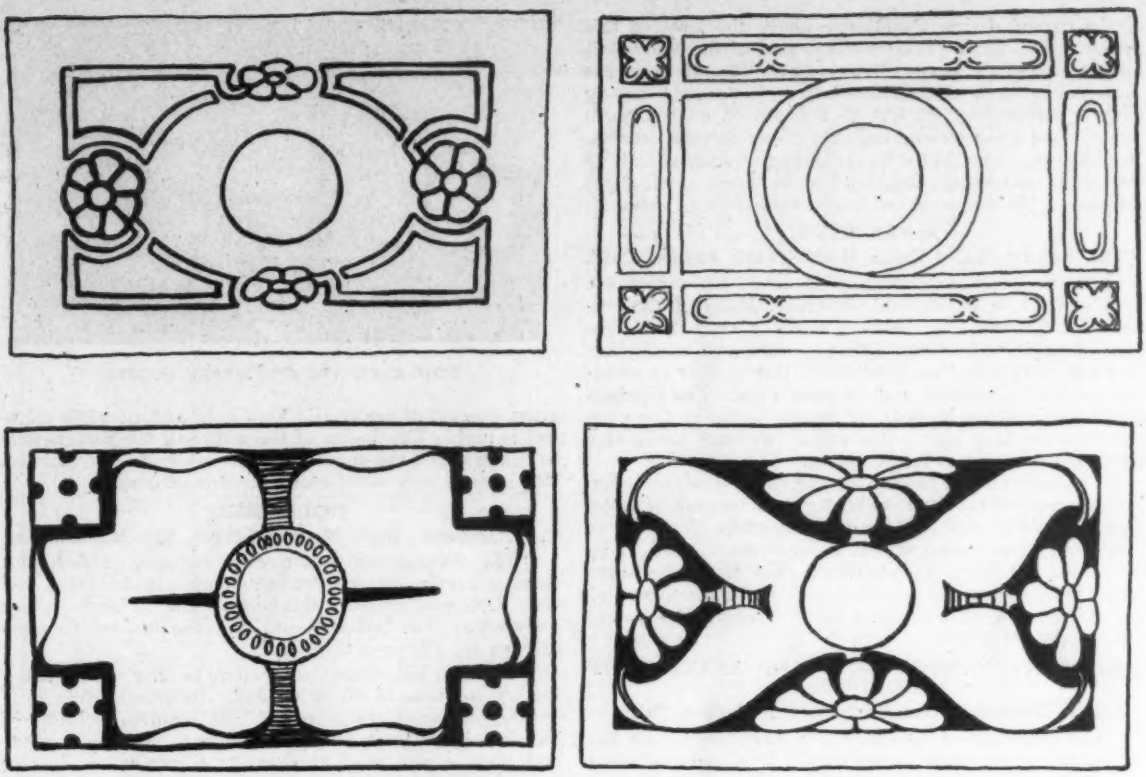
The designs for knobs and the hand carved tops should stimulate interest in making individual designs.

Altho it would be an interesting problem to imitate or copy, why not let each boy invent his own? Crude tho it may turn out to be, it will create in him understanding and respect for a first rate design that he would never attain thru copying that design without appreciating it. And he will like it better if it is really all his own just as he has more affection for his own mongrel dog than for his neighbor's imported Airedale or pedigreed Pomerainian.

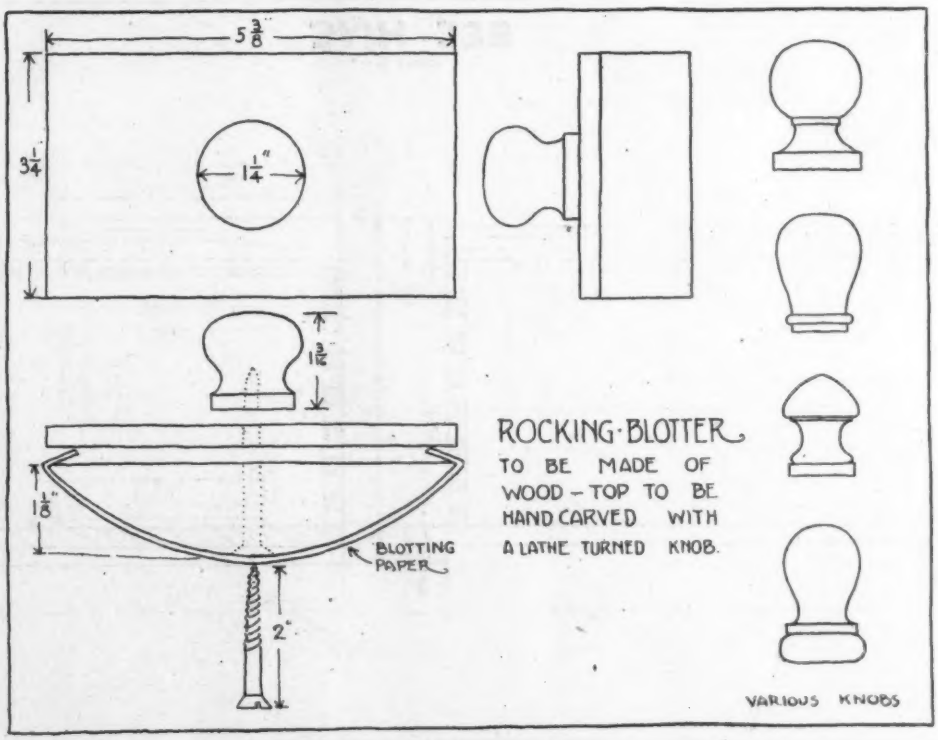
In designing and carving the top, good taste requires that we leave a raised border around the edge and no part



ATTACHING A BUCKLE WITH RIVETS.



SUGGESTIVE DESIGNS FOR ROCKING BLOTTERS (REDUCTION ABOUT ONE-THIRD).



DETAILS OF ROCKING BLOTTER.

of the carved design should rise above the level of this border. The blank circle in the center of the top is left for the base of the knob. To avoid over-decoration do not carve the knobs or sides of the blotter. Use simple carving with a background cut out to a depth of one-sixteenth inch. Good wood carving calls for nicely executed curves. Modifications may easily be made in the designs. Many new and interesting designs may be made thru slight changes in the shapes of leaves and variations of blossoms.

A BEE HIVE.

W. M. Swann, Placer Union High School, Auburn, Calif.

The accompanying drawing of a bee hive was made by a student in mechanical drawing. Many of the students in Auburn keep bees, so some of them made bee hives, frames and supers. They worked out a standard hive and one student made twelve of them. It is an excellent project in jointing and machine work. The rippings and trimmings can be used for frames inside as there are eight frames to a hive. One of the students made over sixty standard frames for bee hives.

The hive can be made of sugar pine or white cedar. Bees do not take to redwood very well because of odor. The dovetailing can be done on a mortiser if one is at hand, and if not, hand saw and chisel can be used. The layout on this work is important. The top is built for water shed. It is put together with box nails (cement) and given three coats of white paint. Supers and frames can be made to match.

COMBINATION BOOK-RACK AND STATIONERY HOLDER.

C. V. Denman, Normal School, San Marcos, Tex.

The combination book-rack and stationery holder has proven very popular wherever tried. Don't let the name scare you out; perhaps it should have been called something different.

The student likes it because he sees several possible uses for it and it is a very serviceable addition to the study table. From the teacher's standpoint it brings in much in the way of construction without involving any great amount of material. This is important when material is high. The design of the ends and the pockets may be changed and the drawer in some cases could be omitted. Red gum is very satisfactory for this problem.

BOOK RACK AND STATIONERY HOLDER.

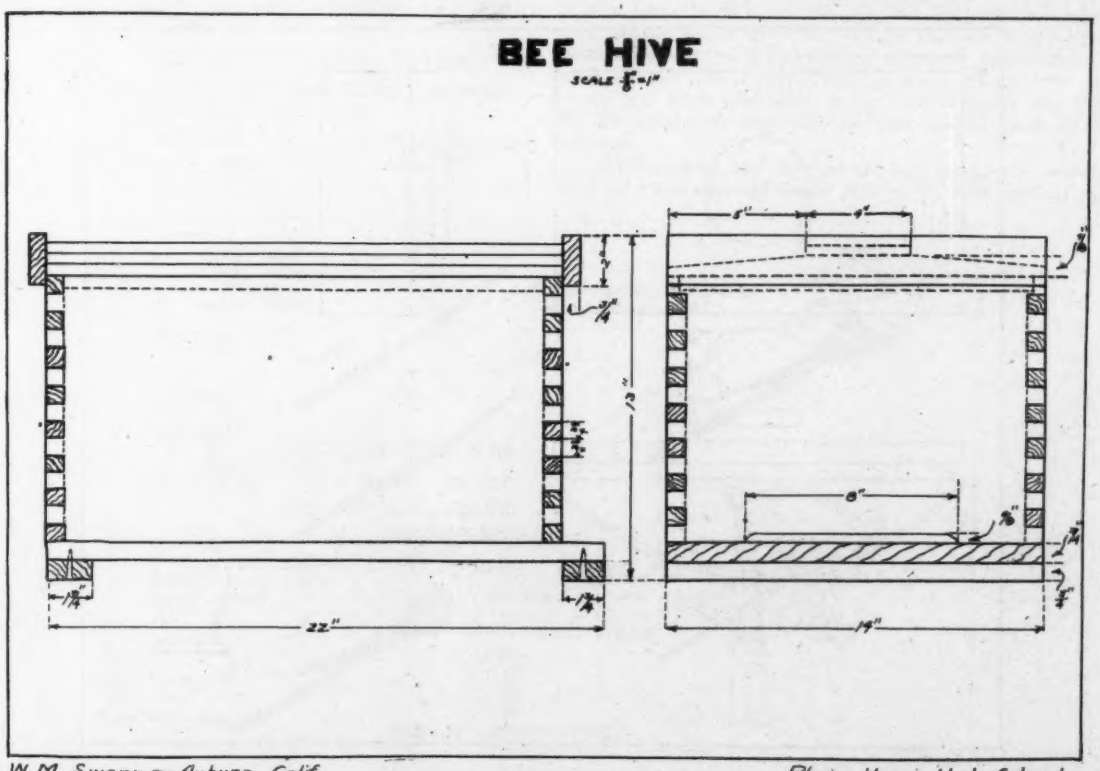
DOLL BED.

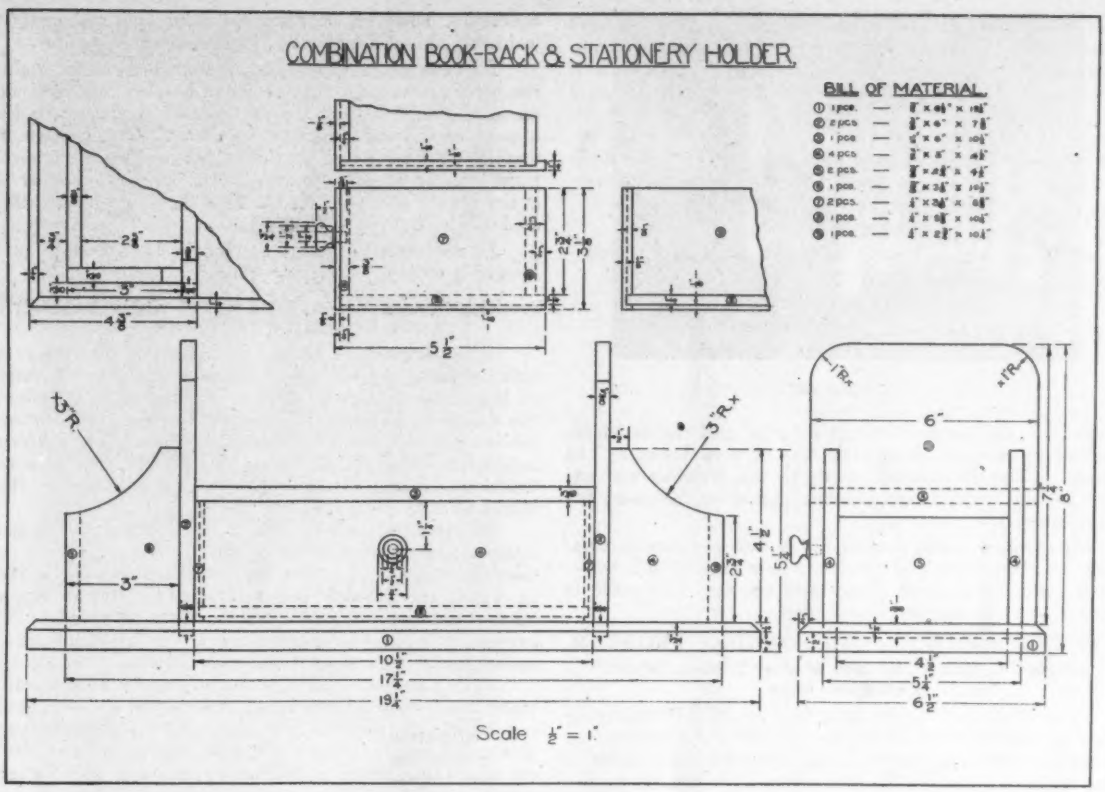
C. V. Denman, State Normal School, San Marcos, Tex.

The average boy would scorn the idea of dolls, but there is hardly one of them but delights in making a doll bed. One would hardly think it possible to make a very satisfactory doll bed without involving construction too difficult for the seventh grader.

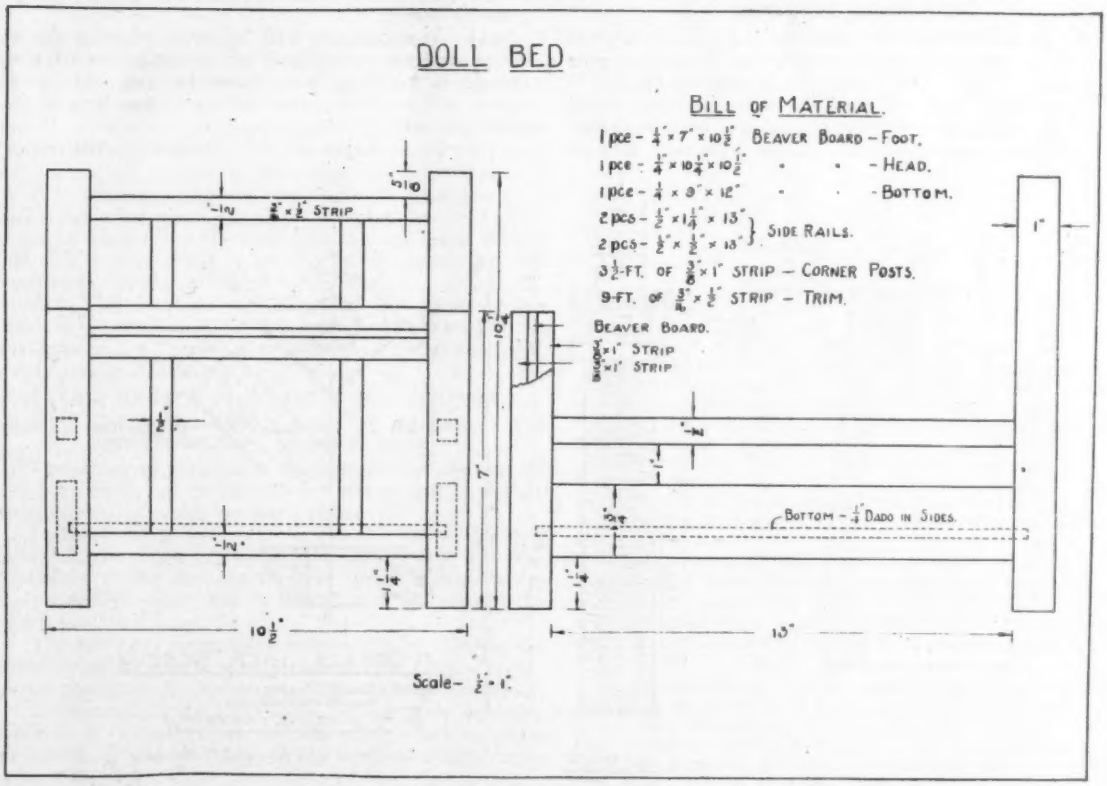
The doll bed shown here seems to offer a very satisfactory solution to all objections. In construction it is not beyond even the beginner. It involves nothing in the way of difficult joint construction, is quickly made and offers a very good opportunity to try out a class or an individual in space arrangement.

Beaver-board, or wall-board, is used for the bottom and the two ends. The strips forming the corner posts and the cross rails are nailed to both sides of this with wire brads. The 3/16″x1½″ strips are next put on in such a way that the large unit of space will be broken satis-

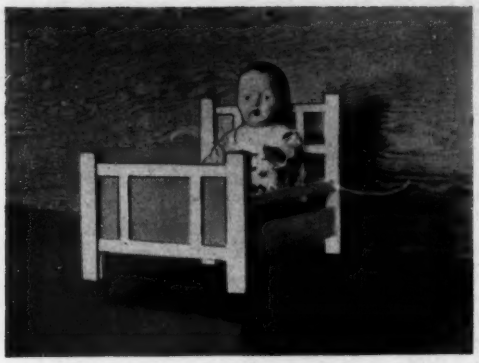




Details of Book Rack and Stationery Holder.


DOLL BED
BILL OF MATERIAL.
1 pce - ¼" x 7" x 10½" BEAVER BOARD - FOOT.
1 pce - ¼" x 10¼" x 10½" " " - HEAD.
1 pce - ¼ x 9" x 12" " " - BOTTOM.
2 pcs - ½" x 1¼" x 13" } SIDE RAILS.
2 pcs - ½" x ½" x 13" }
3½-FT. OF 3/16" x 1" STRIP - CORNER POSTS.
9-FT. OF 3/16" x ½" STRIP - TRIM.
BEAVER BOARD.
3/16" x 1" STRIP
3/16" x 1" STRIP
BOTTOM - ¼" DADO IN SIDES.
Scale - ½" = 1"

Details of Toy Doll Bed.



TOY DOLL BED.

factorily. The bottom is next inserted and the two ends secured to the side rails with No. 13 wire brads 2½" in length. (The dimensions shown in the drawing will answer for an average size doll but should be increased for a large doll.)

If given a white enamel finish this problem is complete in every detail. It makes a comfortable doll bed—some little tot is made happy and the boy who made it feels it is a piece of work well done.

A PATTERN-MAKING AND FOUNDRY PROBLEM.

Edmund C. Hanley, Hackley Manual Training School, Muskegon, Mich.

The small jack screw as shown in the accompanying drawing makes an excellent project for the instructor of mechanical drawing, pattern-making, foundry and machine shop. The pattern for the jack screw may be made in two parts or solid with a "match." The core box also serves as an excellent opportunity in commencing the student on built-up core boxes, applying fillets, etc.

HOW TO DISTINGUISH MAHOGANY AND WALNUT FROM RED GUM.

In the manufacture of furniture and cabinets a great deal of red gum is used as an imitation of mahogany or Circassian walnut. When red gum is properly finished it can be made to look so much like either of these woods that only by careful observation can the true be distinguished from the substitute. There is a very distinct difference, however, between red gum and mahogany or walnut. This difference lies in the size of the pores.

In mahogany, Circassian walnut, and black walnut the pores are so large that they can be seen very distinctly on a smoothly-cut surface of the end grain, where they appear as minute openings smaller than pin holes but visible without magnification. On surfaced faces the pores appear as fine grooves, running parallel with the grain. They are even visible thru the varnish, appearing as dark lines.

In red gum the pores are much smaller and can be seen only with a magnifying glass.

A COOPERATIVE AGREEMENT FOR TRAINING TRADE TEACHERS.

A Department of Trade and Industrial Education was established in the College of Education of the University of Minnesota a year ago to place in effect the provisions of the Smith-Hughes law in training teachers for vocational schools and classes. The Minnesota State Board for Vocational Education has designated the University as the sole training center for the preparation of teachers of vocational education.

In working out a policy of cooperation, the Department under the direction of Mr. Arthur F. Payne, has developed a plan of cooperation with Dunwoody Institute in which the faculty and equipment of Dunwoody are made available for certain teacher-training courses. The agreement which eliminates duplication of equipment and makes for better cooperation, is as follows:

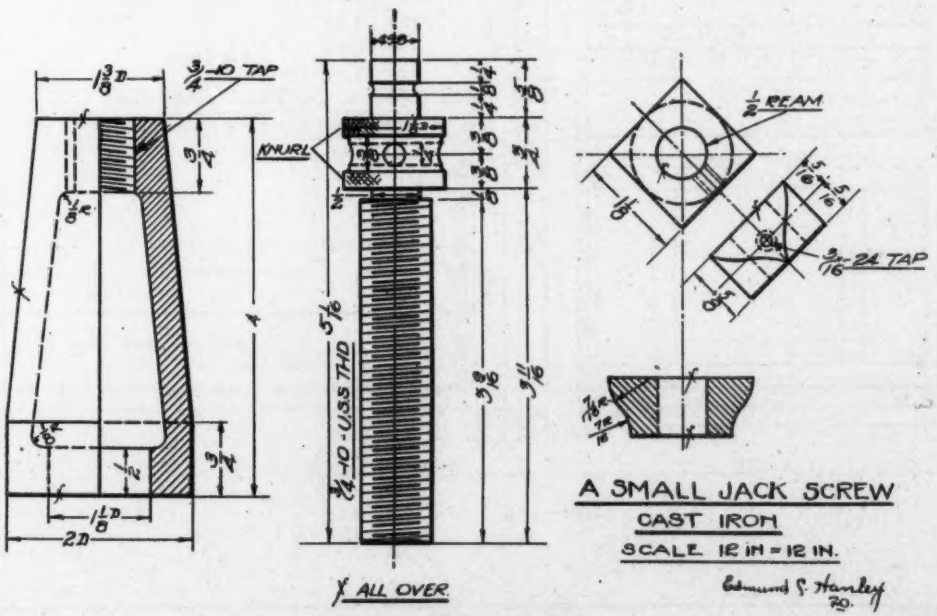
(1) The special field of the university department of trade and industrial education is the training of trade and industrial teachers for the types of schools and classes under the Smith-Hughes law; also, the training of teachers of manual training, industrial arts, and prevocational education.

(2) It is desirable, whenever possible, to provide for an exchange of teachers between the two institutions.

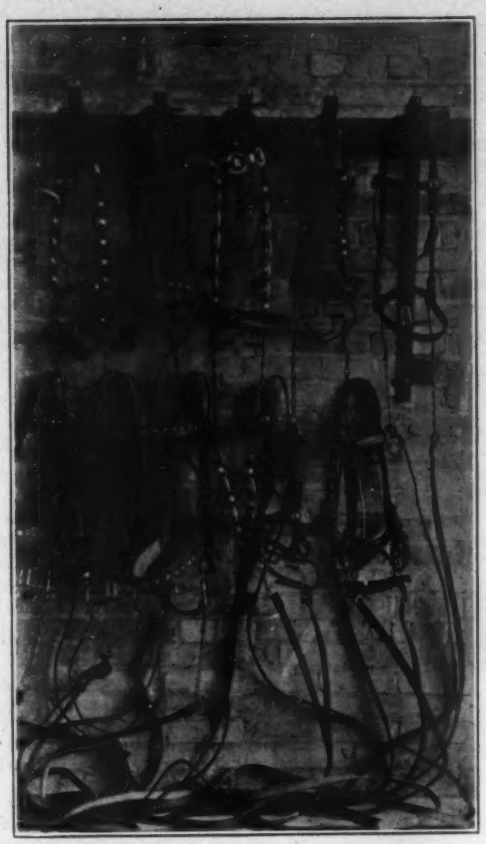
(3) All students taking teacher-training courses will be registered in the College of Education and all fees paid by the university.

(4) Arrangements will be made whereby the university students in methods of teaching trade subjects, methods of teaching related subjects, and other similar courses, will spend a portion of their class time at Dunwoody Institute.

(5) In so far as possible, Dunwoody Institute will



Details of Cast-Iron Jack Screw.



BRIDLES MADE IN VOCATIONAL-AGRICULTURE CLASS, SOUTH CACHE HIGH SCHOOL, HYRUM, UTAH. C. S. VAN LEUVEN, INSTRUCTOR.

be used as the observation and practice teaching school for practice students in the Department of Trade and Industrial Education of the University. This includes day, evening and special classes.

(6) Ten scholarships per quarter will be awarded the faculty of Dunwoody Institute, the scholarships to be good only for regular courses by the College of Education.

(7) Classes given at any time at Dunwoody in teacher training under the Smith-Hughes law by regular or special members of the faculty of the College of Education, will be considered as regular college classes and the members of the classes registered as such.

(8) The purposes and spirit of this agreement is that both institutions shall cooperate in every way in the development of all forms of trade and industrial education in this part of the country.

ANGLE DEVICE FOR THE STEEL SQUARE.

Ralph T. Challender, State College of Agriculture and Mechanical Arts, Bozeman, Mont.

The accompanying tables of angles for the steel square have been developed in the writer's classes and have been found especially useful for rapid classwork.

In the development of tables for the use of the steel square, figures were so chosen as to give whole numbers if possible, or the simplest fraction in those cases where whole numbers could not be found to come within the capacity of the square.

The left-hand columns give the angle in degrees; the second columns give figures to use on the tongue of the square; the third, figures to use on the blade of the square.

Marking along the blade of the square, gives the angle specified in the column at the left, while marking along the tongue of the square gives the complementary angle. As an example:

Suppose we wish to lay out the angle of 9½ degrees. Under the main column marked 8 to 15, and in the left-hand column below, we read the 9½, in the next column to the right 2½, and in the third column 13½. The square is set to the 2½ and 13½. Marking along the latter gives the 9½ degree angle, while marking along the former, gives the complementary angle 80½ degrees. These are the angles included between the edge of the board and the rspective members of the square.

Angle Table for the Steel Square.

Angles from ½° to 22½° by half degrees.

Angle	Inches	Inches	Angle	Inches	Inches
½	1/16	21½	12	2½	11¾
1	⅛	21½	12½	3⅛	17½
1½	⅛	23⅞	13	3	13
2	¾	21½	13½	4½	18¾
2½	⅞	20	14	3	12
3	1	19	14½	3¾	14½
3½	¾	12¼	15	3¾	14
4	⅞	12½	15½	4½	16¼
4½	¾	9½	16	3⅞	11¾
5	⅞	10	16½	4	13½
5½	1¼	13	17	5½	18
6	1	9½	17½	7¼	23
6½	2¼	19½	18	6½	20
7	1¾	14¼	18½	7⅞	23½
7½	1⅞	14¼	19	7¾	22½
8	2¼	16	19½	7	19¾
8½	2½	16¾	20	8	22
9	3¼	20½	20½	5	13⅝
9½	2¼	13 7/16	21	8¼	21½
10	3	17	21½	6½	16½
10½	2½	13½	22	8½	21
11	3½	18	22½	8½	20½
11½	2¾	13½			

Angles from 23° to 45° by half degrees.

Angle	Inches	Inches	Angle	Inches	Inches
23	8½	20	34½	11	16
23½	10	23	35	14	20
24	7¼	16¼	35½	14¼	20
24½	6½	14¼	36	13¼	18¼
25	6¾	14½	36½	9¼	12½
25½	10	21	37	12¼	16¼
26	10	20½	37½	11½	15
26½	10	20	38	12½	16
27	7	13¾	38½	15½	19½
27½	9½	18¼	39	11½	13
28	8½	16	39½	14	17
28½	6¼	11½	40	13	15½
29	7⅝	13¾	40½	14½	17
29½	6½	11½	41	10	11½
30	7½	13	41½	17	19¼
30½	8¼	14	42	13½	15
31	12	20	42½	11	12
31½	12¼	20	43	13¾	14¾
32	10	16	43½	14	14¾
32½	10½	16½	44	14	14½
33	13	20	44½	14	14¼
33½	11¼	17	45	14	14
34	14½	21½			

A SIMPLE CAFETERIA PLAN.

The University High School of the Wisconsin State University is too small to support a lunchroom service, and at the same time it has been necessary to provide hot food for forty children who live at a distance and who bring their lunches each day.

The responsibility for their welfare devolved upon the food classes, and the home economics department, under the direction of the assistant professor, worked out a simple cafeteria plan providing for at least one hot dish thru the cold weather.

Under the plan, one class took over the work. The class divided itself into committees of three, each working on alternate weeks while the remainder of the class carried on the regular class work. The chairman of the work was selected from those who seemed best able to assume leadership.

The members of the committee worked out advanced schedules for each day's work, prepared the recipes, made out the market orders and purchased food materials, all the time keeping careful account of all expenditures. The food was prepared during the usual class hour, or in special cases, before or after class, and was served to the students. The washing of dishes and the placing of the

THE WOODWARD COMMUNITY GYMNASIUM UNDER CONSTRUCTION.

kitchen in good condition was also the work of the committee for the day.

The children ate in the sewing room and in the recitation room next to the kitchen. They early took it upon themselves to keep the rooms neat and clean and to see that they were left in good order. A member of the committee regularly inspected the rooms and removed any crumbs or papers that might have escaped the attention of the boys and girls.

The plan reacted to the benefit of the children and also to the girls in charge of the work. In the latter case, it gave an opportunity to organize and plan work, to assume responsibility, to develop leadership and to meet emergencies with judgment and self-control. The experience in handling money, in satisfying customers, and in the handling of large food quantities, was also of educative value.

A COMMUNITY BUILDING ERECTED BY MANUAL TRAINING CLASSES.

Cooperation is the key to success in community interests and undertakings. The city of Woodward in northeastern Oklahoma is thoroly convinced of this fact as a result of a building project in which the manual training of the high school rendered an important service.

In the fall of 1919 the need of a community building became evident in Woodward. There was no adequate place to house the county fair exhibits, the poultry show or other displays of community projects and the high school was in sore need of a gymnasium for physical training and athletics. At a meeting of city and county officials and business men it became evident that $5,000 could be raised for a building but this sum would be insufficient to cover more than the materials and a small part of the labor. Just here the manual training department of the high school came forward with an offer of its services for the concrete, carpentry and painting work on the building. Mr. Claud Baird, instructor in the department, volunteered to direct the work. The offer was accepted and the work promptly begun.

A local contractor drew the plans and specifications and the boys laid the concrete foundation, and with the assistance of several journeymen carpenters performed the labor of erecting and finishing the building.

The building is 60 feet by 80 feet in size, with an open arena measuring 44 feet by 64 feet. Four dressing rooms are located at one end. The bleachers are on three sides of the arena and seat about six hundred people, and there is available space for one hundred more persons above the dressing rooms. The windows are set up high in the walls as is done in standard gymnasiums.

The building is managed by a committee of three citizens, appointed for the purpose. This committee obviates a conflict of activities and insures the proper care of the building. Since the building has been in use, there have been but few days since it has not been put to some valuable use for the community or the school.

The building is considered by the businessmen of the city to be the best investment ever made for community development. "After all, the greatest good has come to the seventy-five boys," says Mr. Baird, "who, by putting to practical use their knowledge of woodworking tools have given the community a building which any city might be proud to own."

The New England Vocational School of Rutland, Massachusetts, which is established for the rehabilitation of gassed ex-service men, on July 10th dedicated a new building known as the Edwards Club. The building is used for the living and sleeping quarters of eighty convalescent service men who are undertaking training at the school.

It is an attractive structure planned especially for comfort and it is so located that it overlooks a most attractive bit of Massachusetts country. It contains in the basement a classroom and a locker room and on the first and second floors four wards together with a lunch and a writing room. The erection of the building was made possible thru a generous gift of the Red Cross.

The State of New York has passed a law providing for the rehabilitation of physically handicapped persons. Under the law, the State Department of Education is given responsibility in the advisement, re-training and placement of persons physically handicapped.

The law which amends the Workmen's Compensation Act, provides that the insurance carriers shall pay to the Industrial Commission the sum of $900 for each person who dies as a result of injuries sustained in industry, and who has no dependents. This provision enables the Commission to divert about $200,000 annually to the compensation of persons undergoing vocational rehabilitation. An appropriation of $75,000 is provided under the law for the advisement and re-training of handicapped industrial workers.

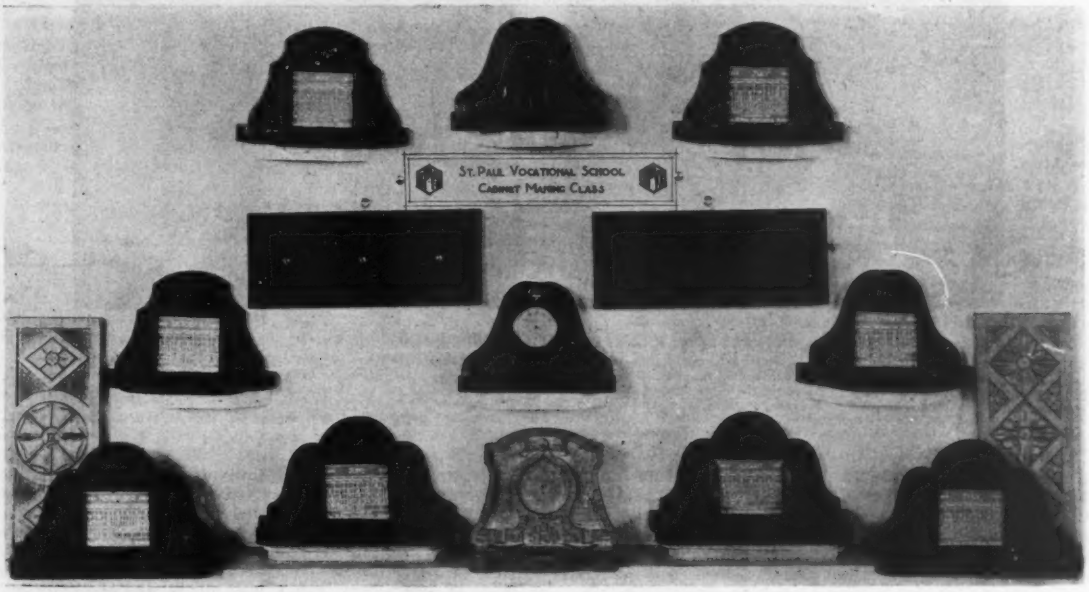
A class in advanced printing has been successfully introduced in the Hot Springs High School at Hot Springs, Ark., under the direction of Mr. B. H. Thomas. It is planned to offer instruction in linotype work and linotype operating.

THE COMMUNITY GYMNASIUM AT WOODWARD, OKLA.

CARVED CALENDAR PADS.

The accompanying photo shows a number of calendar stands made in the wood carving section of the cabinet-making class in the St. Paul, Minn., vocational school. Wood carving is given to all cabinet-making students as a related subject for four hours of a thirty hour week.

This problem was decided upon for several reasons. First, and most important, is the need of advertising the school which is new, and this is done by distributing the calendars where they will do the most good. Second, it strongly ties the shopwork to applied design which obviously is a necessity in furniture and cabinet construction. Third, the problem was expected to develop skill and accuracy, which it has done to a remarkable degree. Lastly, from the standpoint of the students it is an interesting problem as each student receives a stand which is usually placed in a strategic position at home.



CALENDAR AND WATCH PADS, DESIGNED AND MADE BY STUDENTS OF THE ST. PAUL VOCATIONAL SCHOOL.

The calendar sheets were developed in the drafting department and blue printed. Next to the December sheet is attached a notice which mailed to the principal will entitle the sender to a 1921 set of calendar sheets.

Mr. F. H. Thomas is the most efficient principal of this school and is doing for the school the same high grade work that George Brace is doing for all the schools of St. Paul.

VOCATIONAL TRAINING SOUGHT AT LOS ANGELES.

Vocational training in the Los Angeles schools is making rapid progress in many lines. Never before has there been such a desire for such training, those in charge of the work say. Ten city high schools and four intermediate schools are offering vocational courses under the Smith-Hughes act, while several other vocational courses, not aided by the Federal government, are offered in the majority of the secondary schools of the city. The Federal aid given to the schools of Los Angeles amounts to more than $19,000 for the current school year.

Vocational training has been given added impetus by two new modern shop buildings, one at Lincoln school and the other at Jefferson.

Students at Polytechnic High School have recently completed a building at the school grounds, saving the school board approximately $5,000. The material that went into the building cost $10,000, and this was the only expense to the board. The building is a two story wooden structure to be used in connection with the electrical engineering classes. At Hollywood a new addition has been added to accommodate the work in auto repair and construction.

At the schools where printing is included in the curriculum of the vocational classes all of the work for the schools is done in the shops, and in this way several of the schools get out papers and magazines that make a very creditable appearance.

In the agricultural section excellent work is being done, and a number of the schools have large gardens under cultivation. Great interest also is being shown by the boys in the mechanical branches, automobile building, electrical work and other subjects of like nature.

The attendance in vocational classes at present shows an increase of approximately 33⅓ per cent over that of the past year. New classes are being added as the demand and equipment warrant.

Prevocational training and the study of occupations are being developed in the intermediate schools as a basis for vocational guidance and should be most valuable in directing boys and girls in industrial pursuits.

A close correlation is being effected between the applied and related subjects. Numerous conferences of heads of departments, shopmen and teachers of related subjects, have resulted in much good subject matter being whipped into usable form. The teacher of applied mathematics goes to the shop for his problems, as do the instructors in applied science, mechanical drafting and other courses.

An evening's visit at Polytechnic, Manual Arts or Labor Temple will convince even the most skeptical that trade preparatory and trade extension training are eagerly sought in Los Angeles and that the night schools deserve the encouragement and support of all interested in education and better citizenship.

As the result of the interest being shown in the vocational training classes in the city school an institute of technology, where practically all trades will be taught, may be established in Los Angeles. This matter has been brought before the Board of Education, but no formal action has been taken. A large number of manufacturers, merchants and industrial concerns of Los Angeles have expressed an interest in the organization of the institute and letters have been sent out by the members of the Board of Education asking for an expression of opinion from a number of the civic organizations and the larger clubs.

All classes of industrial concerns are urging the establishment of the institute for the reason that an exceedingly small percentage of the young men of today are learning a trade or showing any interest in the trades.

There are a great many industries where the securing of a sufficient number of skilled mechanics has become most difficult, and in some of the trades the shortage of skilled men and apprentices has become alarming. This is particularly true of the printing trade and the clothing industry, according to men interested in these lines.

In many cases the parents are responsible for the shortage of apprentices, the heads of the industrial concerns declare. This is true of the tailors, it is declared.

INTERESTING EXAMPLES OF SCHOOL COLOR PRINTING.

The illustration above shows two remarkable examples of color printing by grade pupils. Both were produced in the Print Shop of the Manual Training Department, McKinley School, Newark, N. J. The cover at the left was used to bind a class essay. The printing is in three colors on purple stock. The cover at the right was used on the February issue of the School Quarterly It was designed by a student and the blocks were cut by students. The printing, which is in six colors on gray cover paper, is particularly creditable. The magazine is published by the pupils and represents the coordinated work of the academic, art and manual training departments.

One of the most prominent local tailors, discussing this phase of the present industrial trouble recently, said: "Parents are loath to have their children follow them in their work. They want to make lawyers and doctors of all the boys, with the result that there are practically no American tailors at this time, notwithstanding that the trade offers excellent wages and good working conditions."

The Master Printers' Association is now considering the advisability of establishing a school where the printing craft and all of the allied work will be taught. This matter was discussed at a meeting of the association some time ago, when a number of students of printing at the public schools were guests.

OVERHEATING REDUCES STRENGTH OF ANIMAL GLUE.

That long continued heating reduces the strength of animal glue solutions is demonstrated by the following test made at the Forest Products Laboratory.

Solutions of a high grade joint glue and a veneer grade glue were heated for 48 hours at 104, 140 and 176 degrees Fahrenheit, and tested every few hours during this period for strength and viscosity.

In the first 7 hours of heating at 176 degrees the veneer glue lost approximately one-half its joint strength, and the high grade glue joints weakened almost as much. The greatest loss in the strength of the glue joints occurred at this temperature. In the solutions kept at 104 degrees there was a sudden drop in the strength of the joints made with the high grade glue after 31 hours of heating, due possibly to a combination of bacterial and chemical action. The veneer glue joints showed a more gradual decrease at this temperature. The most favorable of the three temperatures tried was 140 degrees, but even at this temperature an appreciable weakening in both glues was noted at the end of 7 hours, and longer heating caused greater loss.

The viscosity of the high grade glue declined more rapidly than that of the veneer glue, but at the end of the heating test the viscosity of the high grade glue still averaged higher than that of the veneer glue.

Covered glue pots were used in this experiment. When open glue pots are used the loss in strength caused by the heat is less apparent, since the loss is compensated to some extent by evaporation of the water. On the other hand, the concentration of the glue solution thru evaporation is an expensive means of gaining strength.

WHAT IS DRY ROT?

The term "dry rot", the Forest Products Laboratory finds, is applied by many persons to any decay which is found in wood in a comparatively dry situation. Thus loosely used the term actually includes all decay in wood, since wood kept sufficiently wet cannot decay.

In the more limited sense in which pathologists use the term, "dry rot" applies only to the work of a certain house fungus called *Merulius lachrymans*. This fungus gains its distinction from the fact that it is frequently found growing in timbers without any apparent moisture supply; in reality it does not grow without moisture and is as powerless as any other fungus to infect thoroly dry wood. Given moist wood in which to germinate, it is able to make its way a surprisingly long distance in dry timbers, drawing the water it needs from the moist wood thru a conduit system of slender, minutely-porous strands.

Wood in the typical advanced stage of dry rot is shrunken, yellow to brown in color, and filled with radial and longitudinal shrinkage cracks, roughly forming cubes. In many instances these cracks are filled with a white felty mass, the interwoven strands of the fungus. The decayed wood is so brittle and friable that it can easily be crushed into powder.

The dry rot fungus is active in nearly every region of this country, in Canada, and in Europe. It is very destructive to factory and house timbers and to logs in storage. Coniferous or soft woods are more commonly infected by it than hardwoods.

INDUSTRIAL ENGLISH LESSONS.

The Industrial Service Department of the Associated Industries of Massachusetts and the Bureau of Vocational Guidance of Harvard University have in the year just passed, worked out a number of projects in industrial Americanization. A start has been made on a series of lessons dealing specifically with the processes of typical Massachusetts industries, with the three-fold purpose of providing the workers with an elementary account of the work, furnishing the process of manufacture and the rela-

tion of the job to the industry, and incorporating safety principles.

The essential principles observed in compiling the lessons are as follows:

1. Use simple words which will be of every day value to the workers.
2. Introduce the technical vocabulary which the worker hears most, and which will help him most in understanding the work in which he is engaged.
3. Do not overwhelm the worker with technical vocabulary in a series of elementary lessons.
4. Use simple verb forms such as are found in the present and past tenses.
5. Keep the sentence structure simple, and the sentence short.
6. Practical economy of words, selecting each word because of its particular value in the sentence in which it appears.
7. Develop each lesson, sentence by sentence, so that a logical progression of thought is obvious.
8. Present safety material briefly but strategically, both from the standpoint of wording and of situation with reference to the rest of the lesson.
9. Make transitions from operation to operation as logical and clear-cut as possible.
10. Keep the subject matter on such a plane that the worker will feel a personal interest in it without its lacking the dignity which should characterize a text prepared for adults.

NEW BOOKS.

The Home of Beauty

Paper, 8 inches x 11 inches, 72 pages, illustrated. The American Face Brick Association, Chicago, Ill.

This book is the result of a competition for architectural designs of small brick houses and presents the best fifty designs selected from some four hundred. For the teacher of architectural drawing, the book is of intense practical value in that it affords a comparative study of fifty solutions of a single problem—a house of 20,000 cubic feet content, to be reproduced in brick—and gives a clue to the present standards of simple architectural rendering as practiced in good offices. An introduction discusses the merits of brick in house design, the comparative costs and wearing qualities. Mr. Aymar Embury contributes a paper on "How to Build a House" which gives a practical resume of the problem of the prospective house-owner and his relation to the architect and contractors.

How to Use Cement for Concrete Construction.

By H. Colin Campbell, C. E. Crown, octavo. Cloth, 380 pages. Stanton & Van Vliet Co., Publishers, Chicago, Ill.

This book is interesting in that it is the result of the author's three-fold experience as a practical engineer engaged in concrete construction, as editor of a leading association of cement manufacturers and as a practicing farmer.

The book covers the broad field of concrete construction as applied to the making of utilities and the erection of buildings for the farm. It takes up in sequence, the nature, manufacture and use of cement; the principles of constructing forms and reinforcing concrete; the mixing and placing of concrete and tables, formulae and estimates for concrete work. Subsequent chapters take up in detail, the making of the simplest water trough to elaborate farm buildings. It is encouraging to note that good design, as well as strength and economy in construction, are considered paramount with utility and permanence in use.

The book is prepared in direct, concise textbook style, and directions and suggestions for construction are supplemented with quantity and capacity tables. The book is fully illustrated with working drawings and photographs. Mechanically the book might be improved by numbering the chapters and adding to the index a typical table of contents.

An Index Number for State School Systems.

By Leonard P. Ayres, Department of Education, 70 pages. Russell Sage Foundation, New York City.

The appearance of this little volume is of particular interest at this time following, as it does, the rating placed upon the educational progress of the several states of the union. In a recent announcement by the Russell Sage Foundation, Montana is placed at the head of the list while South Carolina is placed at the bottom.

The book describes the method employed in arriving at the ratings placed upon the educational service rendered by the several states. The elements of attendance, cost and results are reduced to figures which reflect the diffusion, the amount, and the quality of the education that the children are receiving.

The ranks of states are shown by index numbers for four periods, namely 1890, 1900, 1910 and 1918. A cross index shows whether a state has risen or fallen during the periods named. The indexes afford an interesting study of the estimates made.

Mrs. Wilson's Cook Book.

By Mrs. Mary A. Wilson. Cloth, 498 pages. J. B. Lippincott Co., Philadelphia and London.

Here is a modern cook book by a woman who has had years of experience as cuisiniere and instructor and is still in active service. It covers every phase of baking, cooking, frying and stewing. The author proceeds upon the thought that "scientific cooking means the elimination of waste, the preservation of edible resources and conservation of their potential energy thru the preparation of attractive and vitalizing food."

Thousands of recipes are provided. These are presented in a practical manner. The ingredients are so enumerated that they are observed at a glance. The process or operation to be employed is stated in clear language. The book is unquestionably the work of a master hand and mind in the art of cooking.

Animated Cartoons.

By E. G. Lutz. Cloth, 262 pages. Price, $3. Charles Scribner's Sons, New York.

Art teachers will find this book illuminating. It explains in detail, the origin and development of the animated-cartoon style of motion pictures and describes the commonly used processes of making them.

FURNITURE MADE IN THE MANUAL TRAINING DEPARTMENT OF THE TOWNSHIP HIGH SCHOOL, LOVINGTON, ILLINOIS. C. H. DALTON, INSTRUCTOR.

Other projects such as hog houses, hog and chicken self-feeders, chicken coops, gates, etc., were completed and some time spent in repairing old furniture. Sheet metal work is to be added next term.

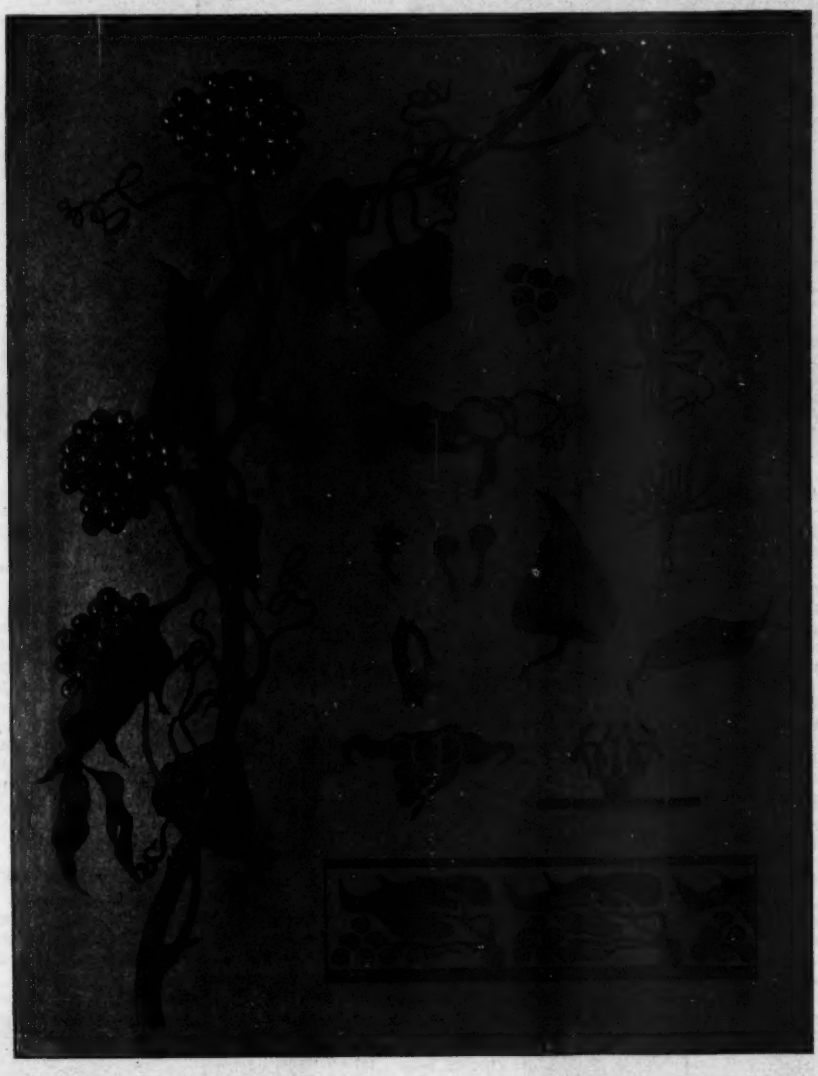
PUBLICATIONS.

Effect on Recruiting of Educational and Vocational Training in the Army. By Capt. Jas. Totten. Issued by the War Plans Division of the War Department. The pamphlet points out that educational and vocational training when combined with military training, means to the army a full authorized strength and more efficient personnel. It means a stable and effective military establishment and a powerful agency for training men in peace. The new vocational trend in the army has made it possible during the last year to enlist more than four times as many men as during an average year before the war. This is due to the increased opportunities for obtaining an education or learning a trade while in army service.

Vocational Training in the Army. By Dr. E. M. Ranck. Issued by the War Plans Division of the War Department. Vocational training in the army, says the pamphlet, gives the boys a chance. In many instances, the boys are kept from school because of a lack of qualifications or of funds. In the camp schools the soldier-students are taught care and handling of horses, hog raising, curing of meats, dairying, cattle judging, farm tractor operation, soil analysis, crop production, truck gardening, fruit culture, poultry raising, farm mechanics and vegetable conservation.

Job Specifications. Bulletin No. 45, 1919 of the Federal Board of Vocational Education. This pamphlet which has been prepared by Franklyn Meine, agent for employment management of the Federal Board, is one of a series dealing with the subject of employment management. It discusses in particular, such problems as job analysis and job specification, terminology, standard procedure, development of industrial job specifications, job specifications in stores and offices, and the method of making job analyses.

The Appleton Vocational School News. This is an annual dedicated to W. S. Ford, Director of the Appleton Vocational School. It contains illustrations of the different classes and departments, such as millinery, sewing, home nursing, cooking, metal trades, woodworking, printing, etc. A report by Director W. S. Ford for the school year of 1919 is also given.



DESIGNS BY MISS RACHEL SKINNER, INSTRUCTOR OF ART, HIGH SCHOOL, CHAMPAIGN, ILL.

Typography—Composition, Press Work, Color Work. Executed by students of the Elm Vocational School, Buffalo, N. Y. Paper 9½x12½ inches.

This booklet makes an impressive exhibit of interesting printing executed by students in one of the oldest schools in which printing is taught. It opens with a brief outline of the course of study offered in the school and then shows examples of business cards, letterheads, cover and title pages, programs, menus, advertisements, etc., designed, set up and printed by students. The grade of typography is one that any good commercial shop would be proud to show.

The Addisonian. Monthly magazine edited, printed and published by the students of the Addison Junior High School, Cleveland, Ohio. A very creditable school paper—especially good in illustrations and typography.

DETROIT MANUAL TRAINING CLUB.

The last event of the school year for the Detroit Manual Training Club was a field day and chicken dinner at a club house on Lake St. Clair on June 19. The sports included baseball, volley ball, soccer, quoits, track events, boat races, swimming, and some contests for the ladies. Prizes for the events were awarded after the chicken dinner.

At a meeting of the club held at the Cass Technical High School a few days before the outing, the members listened to an interesting talk by Mr. D. T. Randall, M. E., Head of the Experimental Department of the Lincoln Motor Co. of Detroit. Mr. Randall talked on the "Development of the Gas Engine," tracing the improvement of this very useful and indispensable machine from the crude, clumsy, inefficient engine first used in about the year 1860 to the dependable and efficient type in use today, citing its uses in the stationary power plant, farm tractor, truck, pleasure car, and airplane.

In the matter of fuels, the speaker discussed the use of kerosene, crude oil and distillates, all of which are used in the Diesel engine; producer gas, made from coal, lignite, wood and peat; gasoline, the standard fuel for motor vehicles, and alcohol, a fuel which has the advantage over gasoline in that it may be used with a compression nearly twice that which may be used with gasoline. In connection with the use of producer gas, he also spoke of the more recent use of the gas from the blast furnace. By the utilization of this by-product, an enormous saving may be effected. The cylinders of these engines, however, must be of much greater proportions than the ordinary gasoline engine, owing to the fact that the gas is diluted with nitrogen which decreases the effectiveness of the gas to a great extent.

Taking up the subject of ignition, the speaker reviewed briefly the early use of the "hot tube" by means of which the explosions in the early types of engines were secured. After this device, came the "make and break" ignition system, followed by the present-day high tension ignition with the spark plug. Speaking of spark plugs, he asserted that the plugs of today are much superior to those used a few years ago, great improvement having been made along these lines during the war.

Mr. Randall then took up the subject of testing and gave a little insight into the difficulties confronting the designer in perfecting the mechanism to a point at which all cylinders will perform equally well at all speeds. Great difficulty is experienced in delivering a uniform mixture to all cylinders under varying conditions and at varying speeds. In this connection, the carburetor and intake header have received a great deal of attention from designers. In the matter of balance, Mr. Randall said that considerable care must be taken to see that reciprocating parts are of uniform weight and that for this reason more attention is given to machining these parts all over instead of on only the bearing surfaces as was formerly done.

In closing, Mr. Randall commended the work of the designers of the Liberty Motor, the weight of which is only 2.2 pounds per horse power, while the average automobile engine weighs about 10 or 11 lbs. per H. P. This extra weight in the motor car, however, is justifiable when it is remembered that a Liberty Motor was expected to perform during the war not more than 60 hours without a thoro overhauling whereas an automobile engine is expected to run for a whole season.

At the business meeting, preceding this address, the following officers were elected for the coming year:

President, Thomas C. Whyte.
Vice President, A. W. Cornwall.
Secretary, John Pliska.
Treasurer, John H. Trybom.

—*H. R. Jenney.*

JOINT MEETING OF COUNTY MANUAL ARTS TEACHERS.

The Association of Art and Manual Training Teachers of Westchester, Rockland and Putnam Counties of New York State held an unusually interesting annual meeting at the Metropolitan Art Museum on May 21st.

Four speakers addressed the conference. Miss Patrick of Teachers College, Columbia University, spoke on "Objectives in Industrial Art Teaching." Miss Abbot of the Museum, spoke on "The Function of the Museum in the Furthering of Art Education." Miss Nourse spoke of her work in connection with industrial art in Mount Vernon. Finally, Mr. Winslow, New York State Specialist in drawing and industrial training, gave an outline for the industrialization of the course of study. The outline took up the following subjects, one each month from September to June: Food, clothing, shelter; records and art products; light, heat and power; food, clothing and shelter. The New York State Department of Education has a library on industrial art which is loaned to schools for the period of one year. Mr. Winslow has an exhibit of excellent high school art work in the state which is sent to art teachers on request.

The officers elected at the business meeting were:

President, Miss Margery Wilson, Scarsdale; Vice-President, Miss Elsie Nourse, Mt. Vernon; Secretary-Treasurer, Miss Jennie Clark, White Plains.

Margery Wilson.

BOSTON MANUAL TRAINING CLUB ELECTS OFFICERS.

During the last month the last meeting for the season of 1919-1920 of the B. M. T. C. was held at Healey's Hotel. The following officers were elected to hold office till June, 1921:

Geo. C. Greener, President.
Owen C. Evans, Vice President.
Andrew J. Leahy, Secretary.
Geo. F. Hatch, Treasurer.
Martin C. Olson, Librarian.

Immediately after the election Professor Hoopengarner of Harvard College expressed his views on industrial employment from the broad point of view of education and industry. During his enlightening address the following points were brought out:

In our highly complex society of today we live relatively. Many are involved in the making of each product and as the production increases and specialization creeps in we make a highly competitive industrial order. With this we have a highly capitalized one which is not necessarily capitalistic. The result is that the general public gets production, even tho unequitably distributed, capital gets the profits and the worker an income without any control of production. The worker hence has an unstable job with very little chance to rise.

It is however the business of capital to produce to make moneys even tho the laborer become a tool and the factory system materialistic. Some results have been that too much was produced, labor became a commodity and the social status of the worker dropped. Then labor organized and capital combined for warfare. Labor wants better working conditions and status in life, a voice in the business with more earnings, a reasonable certainty of employment and the distinct understanding that he is human.

Society is essentially psychic and mind is the same for all people. Hence education points to a solution of difficulties. Quantity of production must be determined by the nature of the product, its distribution and wealth as well as the effect of production upon the people. Why produce many things which add nothing to our collective happiness?

INDIANAPOLIS AGRICULTURAL CONFERENCE.

A conference on vocational agriculture was held May 13th in Indianapolis under the direction of Mr. J. A. Linke, agent for agricultural education for the Federal Board of Vocational Education. Ten states in the region sent representatives.

The opening session of the conference was given to a general consideration of the farming problems. The principal speaker was Mr. Gunnell of the central office of the American Farm Bureau Federation at Chicago, who outlined the immense task ahead of the farm bureau. He suggested that the vocational teachers cooperate with the bureau in advocating better churches, schools, roads, homes, a better community life and more modern methods. He pointed to the fact that the production of farm products last year was up to the average for the past ten years and that the big industries such as steel and iron had decreased their output 25 per cent.

The three remaining sessions were devoted to round-table discussions on the teaching of vocational agriculture. The methods of the great agricultural states of the Middle West were studied and the vocational teachers of Missouri were assured that the progress of the work in the state compared most favorably with the best in other states of the vicinity.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Finish for Cedar Chest.

65. Q:—I am writing you in regard to the best finish for cedar chests. I am making a red cedar chest bound in birds eye maple and mahogany. What is the best way to finish the mahogany, also the maple? How would you bring out the color in the cedar if it has become faded?—*E. V. W.*

A:—The mahogany may be readily stained thru the use of a saturated solution of lime water, which can be bought at any drug store and which will not affect the color of the birds eye maple rather tend to bleach it at the same time it darkens the mahogany. After thoroly drying, the wood should be given a wash coat of white shellac reduced with alcohol and then sanded smooth, after drying hard. It will be necessary to fill the mahogany with a chocolate brown filler, but it should be carefully done in order that as little as possible may affect the color of the maple. Allow to dry 48 hours and clean up all work very carefully with a good 0000 paper and follow with a coat of Degrah, which is a very pale varnish especially applicable to this class of work. The finish should be continued for three or four coats and the last two should be carefully rubbed out with felt pad, FF pumice stone and water and then cleaned up in oil.

The only way to restore the color of the cedar where it has become faded is to scrape it down to new wood and refinish in clear varnish. It is not necessary to use shellac since the varnish will tend to heighten the color effect on the first coat. If the cedar is a lining for the chest and has simply lost color, the only method is to use a very sharp bevel edge scraper blade and resurface.—*Ralph G. Waring.*

Finishing Reed Furniture.

77. Q:—I wish you would please inform me what kind of a greenish mildew filler is put on reed furniture after the stain has been applied? Where can this filler be obtained?—*L. L.*

A:—After the reed furniture has been stained, spray or brush on a very thin coat of lacquer or reduced white shellac. When dry this may be followed with a filler material to be made up as follows:

Any good, hard, drying flat inside-white paint may be used as a base material. It should be tinted to a medium shade of ivory, next slightly shaded to a gray with drop black or ivory black, keeping the color light and then should be tinted with chrome green until a light sage green of a grayish cast is produced. This may be either sprayed or brushed on the reed, and if high lighting is desired should be wiped off on all exposed portions with either a cloth or a stiff bristle brush as soon as the material shows signs of hardening. It is best not to attempt to cover more than a small portion at a time as for instance the arms or a side. It is best to try out the color on the under side of the chair and in case the shade does not quite satisfy the individual taste it readily may be altered. If it is desired to leave this in the dead flat finish, simply set it aside in a warm room until thoroly hardened which will be about two days. On the other hand, if some gloss is acceptable a coat of varnish of the flat drying type or socalled satin finish may be used as a finishing coat. With these two mediums of paint and varnish at hand and a bristle brush or cloth practically any effect may be obtained thru their proper manipulation to produce shades or high lights.—*Ralph G. Waring.*

Mirrors.

79. Q:—Will you please give me information as to refinishing mirrors properly?—*M. H.*

A:—Use Bassett's method which is described in Walter K. Schmidt's Problems of the Finishing Room, published by the Periodical Publishing Co., Grand Rapids, Mich.; also Hopkins' Scientific American Cyclopedia of Formulas published by Munn & Co., New York.

83. Q:—I found the Kunou Toy Book very useful and would like to know if you have or know of other books on toymaking?—*P. O. D.*

A:—*The Boy Craftsman*, A. N. Hall, $2, Lothrop, Lee Shepard, Boston, Mass.; *Manual Training—Play Problems for Boys and Girls*, W. S. Marten, $1.25, Macmillan Co., New York; *Coping Saw Work*, Ben Johnson, $0.20, Manual Arts Press, Peoria, Ill.; *Manual Training Toys for the Boy's Workshop*, H. W. Moore, $1, Manual Arts Press, Peoria, Ill.; *Toys and Things, Booth*, $1, Geo. Doran & Co., New York; *Home Made Toys for Boys and Girls*, A. N. Hall, $1.25, Lothrop, Lee & Shepard, Boston, Mass.; *Toy Making for Infants*, Eden, $1, Isaac Pitman, New York; *Toy Making at Home*, Adams, $0.60, F. A. Stokes Co., New York; *Toy Making in School and Home*, Polkingborne, $2, Hubbell-Leavens Co., New York; *Toy Making*, $0.50, Funk & Wagnalls, New York; *Playthings I Can Make*, H. A. Sage, $0.35, Platt & Neck, New York; *Toy Model Book*, $0.25, E. P. Dutton Co., New York; *Little Book of Well Known Toys*, $0.45, Rand, McNally & Co., New York; *Toy Making*, Cassell & Co., New York; *American Boys' Workshop*, C. B. Kelland, David McKay, Philadelphia, Pa.; *Handicraft for Boys*, A. F. Collins, F. A. Stokes Co., New York; *Industrial Work for the Middle Grades*, E. F. Worst, $3.50, Bruce Publishing Co., Milwaukee, Wis.

Shellac vs. Wax Inlaying.

81. Q:—Can you give me some information about wax inlaying? I am told that wax, resin and dry colors are the elements. What kind of wax does this mean?—*G. H. F.*

A:—Artificial inlaying can be readily done thru the use of stick shellac which may be bought thru any large paint supply house in twenty or more colors, including white. The grooves are prepared as for inlaying and the shellac is run in with an electric soldering copper or any iron heated sufficiently hot to melt, but not burn the shellac. This is especially to be noted in the case of the white and cream shades used to imitate the lighter woods. This material is practical only for solid line inlaying since it would be quite impossible to make up the variegated patterns with the material.

I have found that where I have observed the use of wax, resin and dry colors as inlaying material on old furniture, that its adhesive properties have been poor and that in warm rooms its tendency has been to shrink and crack. None of these faults is true of the stick shellac which should fill the groove slightly higher than the surrounding surface and must then be scraped, sandpapered to a perfectly level surface. It is a material which may be used equally well on straight or curved surfaces and if carefully done should prove as satisfactory as does the wood inlaying.—*Ralph G. Waring.*

COMMERCIAL OCCUPATIONS SURVEY.

The Federal Board for Vocational Education is cooperating with certain state vocational boards in making a survey in 24 cities to determine what kinds of commercial positions are held by boys and girls 14 to 17 years of age, what training will be helpful to them in their work, and what lines of promotion are open to them.

The date obtained from the survey will indicate the kind of business courses that are needed for continuation schools which hope to "increase the vocational intelligence" of younger commercial workers.

The states chosen for the survey are the ones which have passed a continuation-school law. The cities were selected by the director of vocational education in each state.

The commercial teachers are cooperating with the local vocational and commercial education directors in carrying out the plan for making the study prepared by the Federal Board.

The following cities are making the survey: Syracuse, N. Y.; Springfield, Mass.; Huntington, W. Va.; Trenton, N. J.; Detroit, Mich.; Cincinnati, O.; Rockford, Ill.; Galesburg, Ill.; Des Moines, Ia.; Sioux City, Ia.; St. Louis, Mo.; Kansas City, Mo.; Lincoln, Neb.; Tulsa, Okla.; Ogden, Utah; Portland, Ore.; Missoula, Mont.; Phoenix, Ariz.; Salem, Ore.; Seattle, Wash.; Reno, Nev.; Albuquerque, N. Mex.; Elizabeth, N. J.; Battle Creek, Mich.